Telephony.

THE AMERICAN TELEPHONE JOURNAL

Comprising Telephony, American Telephone Journal, Sound Waves, Telephone Magazine and The Telephone

Vol. XVIII **CHICAGO, SATURDAY, JULY 31, 1909** **No. 5**

PUBLISHED EVERY SATURDAY BY THE

Telephony Publishing Company

Monadnock Block, Chicago

Telephone Harrison 2951

H. B. McMeal, President **F. S. Kenfield, 1st Vice-President**
W. H. Graffis, 2d Vice-President **H. D. Fargo, Secretary-Treasurer**

Edited by H. B. McMeal and Franklin H. Reed

The present publication comprises

Vol. 57	The Telephone	No. 5
Vol. 34	Telephone Magazine	No. 5
Vol. 20	American Telephone Journal	No. 5
Vol. 18	Sound Waves	No. 5
Vol. 18	Telephony	No. 5

TERMS OF SUBSCRIPTION:

United States, Cuba and Mexico.....per year, $3.00
Canada 4.00
Other Foreign Countries within the Postal Union..... 5.00

NOTICE TO ADVERTISERS

Changes of advertising copy should reach this office ten days in advance of date of issue. New advertisements accepted up to noon of Monday for the paper dated Saturday of the same week.

Copyright, 1909, by Telephony Publishing Company

Entered as second-class matter September 4, 1908, at the post office at Chicago, Ill., under act of March 3, 1879.

CHICAGO, SATURDAY, JULY 31, 1909

CONTENTS.

Editorial 95
Central Office Locations. By S. D. Levings..... 97
Telephonic Reminescences. By C. E. McCluer.....100
History of the Automatic Telephone. By Arthur Bessey Smith.102
Electrolytic Corrosion of Telephone Cables. By Elam Miller....104
The Importance of Independents Purchasing from Independent Manufacturers and Supply Houses. By Henry A. Clark.....106
Letters on Practical Subjects.....107, 108
A Broadside from Boston.....108
A Gas Plant Manager's Ideas on Depreciation.....111
Practical Questions and Answers.....112, 113
Telephone News 113, 114, 115
Telephone Patents. By Max W. Zabel.....115, 116
Condensed News Reports.....119, 120

Poor Old System!

The weather must have been hot in Boston. The choice war thoughts of the valorous Information Department of the American Telephone & Telegraph Company betray a touch of the sun. And in working out of its "System" the sad and gloomy ideas about the Independent telephone companies which have been engendered by too persistent gazing upon the hot cobblestones of Milk street, the writers of the attack on the Independents reproduced in other pages have given for good measure a touching glimpse of their philosophy of intercommunication. True enough the manufacturing branch of the "System" does aim at universality of distribution. It even has an emissary in China working up a plan to give the Oriental millions long distance telephones of the same kind that are used in Chicago. But we do not anticipate that the Chicago merchants will receive many telephone orders from Hong Kong this year.

As far as opposition and competition are concerned, the Bell company seems to have been so impressed by the fact of competition that it will stultify itself before the public by crying its non-existence; but, about opposition, it has stated a truth without grasping its meaning. In fact, "opposition does not mean competition." Opposition, when carried far enough, is war; and war is wasteful. By opposing the Independents, the Bell companies have wasted their resources on an enormous scale. By competition with their rival, the Independents have created an industry with remarkable powers of growth, endurance and, when need arises, it must be said, of reproduction. For, once the public has enjoyed the fruits of competition, a merger of competitors has shown itself to be but the forerunner of the organization of a new system to compete with its consolidated predecessors.

As for the serious meaning of the circular, it is simply that the Bell company is still scared, trying to fight, and provided with poor ammunition.

The appearance of the circular at this time tends toward confirmation of the truth of TELEPHONY's conclusions, stated editorially two weeks ago, that all signs point toward a new period of great prosperity for the Independents, already beginning. The present circular will be as effective in retarding their progress as a latticed paper screen in the path of an elephant.

One thing more—now is a good time to see that the

local newspapers print facts about the growth and prosperity of the Independent companies, the country over. And if every man does his part to get these facts in the hands of investors, circulars of "the opposition" will be dismissed by all with the remark made by a banker who sent us one: "Those fellows think we don't know who is getting the telephone business in our town. When are they going to wake up?"

Use of Telephones in National Forests.

The telephone in the national forests is not only of the greatest assistance in the management of the forests, but its value is inestimable when used to report or summon help for a fire. In a single case of forest fire it may be worth the entire cost of its construction. No other work of improving the forests has been more acceptable to the residents in their vicinity.

In the summer of 1905, Secretary Wilson and United States Forester Gifford Pinchot, after going over large areas of little developed and almost unexplored national forest land, decided that systems of telephones, with proper connections, would be invaluable in the forests of the West.

It was not until some time later, however, when congress made a specific appropriation for the improvement of the national forests, that funds were available for this purpose. Last year 3,200 miles of telephone lines were constructed in the 148 national forests in the West, and wire to build about 400 miles of additional line was shipped to the various forests, but with the funds on hand the work of construction could not be completed.

A town in southern Utah, with about 1,000 inhabitants, was isolated four days' ride from the nearest railroad station until a telephone line was built by the Forest Service across the mountainous country for forty miles, thus connecting the town, the headquarters of the forest, and several ranger cabins, with the telegraph station.

From two to five ranger stations are now connected with the supervisor's office in many of the national forests, and by the use of telephones in the homes of settlers centrally located, other points in the forest are reached. The marked saving in time otherwise required for a trip of from twenty to forty miles is evident.

In some forests "lookout stations" have been established, to which a wire is run. A man is stationed in the vicinity, so that he can climb the point of vantage several times each day and with his glass sweep over the landscape in every direction, quickly scanning an area of two or three hundred thousand acres. It is by such plans that fire patrol and fire control have been established in the national forests with an exceedingly small protective force, and damage from fire has been reduced to a minimum.

The Function of the Bones of the Head in Hearing.

Ordinarily the sounds we hear come to the ear as waves in the air. These waves are collected by the outer ear, and impinge on the drum. Gathering sound waves and ornamenting the head are not the only uses of the outer ear. It is probable that, in the case of high-pitched sounds, we determine the direction from which they come by the aid of the outer ear shell. If a body is sounded near us, two sets of waves, one to each ear, reach us, and the wave reaching the ear nearest the source of sound is ahead of the other wave in phase. Elaborate experiments by Lord Rayleigh and others have shown that the mind judges the source of the sound to be in the direction from which comes the train of waves most advanced in phase. A sound may come from a point directly in front of, or behind, one and still he has no difficulty in judging from which direction it comes. The small phase difference caused by traveling around the outer ear undoubtedly has something to do in forming this judgment.

The outer ear is not necessary to hearing, however. So long as the auditory nerve and its endings are healthy, hearing is possible. When the ear drum, or the bones of the middle ear are defective, but the inner ear sound, the person can use a telephone nearly or quite as well as a person having normal ears. Experiment shows that very faint sounds are not heard. Here the bones of the head take the vibration from the receiver to the sensitve inner ear. A tuning fork, sounding so faintly that it cannot be heard, becomes audible if the stem is pressed against the teeth. Every one knows that the intensity of the sound in a receiver is increased if the receiver is pressed tightly to the head. All the components of the sound are intensified, and any "scratching" or other unpleasant side-tone is not relatively lessened by holding the receiver away from the ear. It is a mistake to suppose that a purer sound is obtained from a receiver having a soft rubber shield or pad over the end. The only effect of one of these pads is the weakening of the sound.

The Meaning of a Name.

"What's in a name?" To the outsider, the name "Home Telephone Company" may mean little or nothing. It might have been called "Star Telephone Company," "Rising Sun Telephone Company," or anything else. It would make little difference. But it means much to the owners. It carries with it the associations of years of growth, the efforts for success, the relations to other men in the business, and all that goes to make up business.

To the customer of any concern its name unconsciously carries with it an impression of the quality of goods sold, the treatment received, and the general air of the establishment.

For what does the name of your company stand? Do your subscribers associate it with good service, courteous answers, and fair dealing? How about your personal name as manager, superintendent, or wire chief? Does it suggest prompt, correct, energetic work and loyalty to the company?

Have you been conducting the company's business from the inside *outward?* If so, get outside and take a look *in.* See how others regard it. Try to make your name and business a synonym for good telephone service. There is as much in a name as you put there.

Central Office Locations*

By S. D. Levings

To determine the location of the ultimate telephone center, a white paper map is needed, such as was used for the initial location study. But instead of showing the initial telephones in the various blocks, the ultimate telephones should be shown in the present blocks, and those in the annexed territory for the ultimate period as shown by the development study records. In exactly the same way as described for determining the telephone center for the initial telephones, the ultimate location is found for the ultimate telephones. All physical conditions introduced by the addition of territory going to make up the ultimate should be taken into account, and all other features tending to influence the ultimate location should be carefully considered. When the ultimate location has been determined, a third white print map should be obtained, and it and the initial location plainly designated thereon, together with the distance between such locations, in fact, noted in a conspicuous place. It may be stated that in no case will these two points coincide, and the method of determining the best location, at a point somewhere between the two, which will serve both the present and ultimate territory and number of telephones most economically, is set out in the following:

The first work in determining the actual location of the central office is the considering of the two theoretical locations, present and ultimate, from the standpoint of cost. It has been stated elsewhere that the average cost per telephone in the manually operated exchange serving a single office town is approximately $70, assuming that the location of the exchange is in a position approximately at the telephone center. Technically, the shifting of the telephone center does affect the cost per telephone, if the distance which it is moved is of appreciable extent, but, for the purpose in hand, it is felt that this refinement need not be considered. Let Fig. 8 represent a town in its present and ultimate limits, and in which O' is the initial and O'' the ultimate theoretical central office location as determined by the study for the telephone center. If all the telephones, namely 8,500, are considered as being switched from O', the cost of the plant built around O' as the central office would be 8,500 x $70, or $595,000. Upon the basis that the shifting of the location does not affect the cost per line, the cost of the plant for 8,500 telephones with O'' as an office location would be the same as for O',

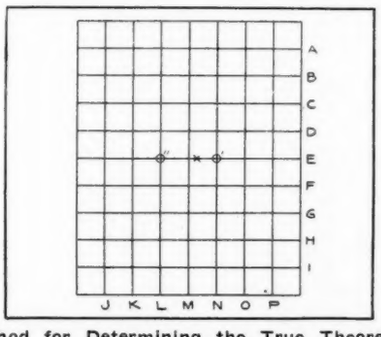


Fig. 8. Method for Determining the True Theoretical Central Office Location.

namely $595,000. With this as the basis for a cost comparison, it may be said that the cost per line, being an approximate constant for either location, may be neglected. Without further explanation, it is clear that, roughly speaking, the initial number of telephones fed from the initial office location is to the ultimate number of telephones fed from the ultimate location, as the unknown distance from the initial location to the actual location is to the known distance from the initial to the ultimate location. Therefore 3,500 telephones at O' are to 8,500 telephones at O'' as an unknown distance from O' toward O'' is to the actual distance, 2,640 feet. Putting this statement into an equation it gives $\frac{3,500}{8,500} : \frac{X}{2,640}$. Solving, X equals 1,087 feet, the distance of the actual location from O', toward O'', and which is shown in the diagram at X. X, therefore, is the solution of the problem in hand, and may be designated as the most economical location for central office which is to be built.

Having determined the true theoretical location for the central office, the exact location, or lot, is to be found, and the factors influencing the selection of such a lot are now to be discussed. The following matter is applicable to multi-office territories. It must be remembered that the work just completed resulted in locating the office relative to a position on or at the intersection of one street with another. In many cases it will be found that there is no available property at such a point of intersection which can be either rented or purchased for exchange purposes. The best thing, of course, to be done in a case of this nature is to select a location as close as possible to the point of intersection, providing that it complies with the requirements set out in the following. No other problem in electrical distribution work presents the same features that are to be encountered in telephone central office location. It may be said that selecting a telephone central office location or site is the more simple perhaps, owing to many features being of no importance that are all-important in other branches of electrical work. As an example, in electric power distribution the center is calculated in the same way as in telephone work, but as fuel and water are the essential items in furnishing the power, the central station must be in such a location as to be readily accessible to transportation lines which supply it with fuel, and convenient to water which is used in conjunction with the fuel. This shifting of location, for the reasons given, many times leads to no small expenditures that could otherwise be avoided, and which may be avoided in the case of telephone work. It is true that water, electricity and gas are needed in the exchange, but only in such quantities as are required by ordinary commercial manufacturing establishments, and which are supplied by the regular means adopted in the town in which the central office is located. There are limitations, however, in locating telephone buildings, which, while not as inflexible as those met in the case of power distribution, should always be borne in mind.

There are two ways of establishing an exchange, one by buying the property and erecting a special exchange building upon it, or by renting property and remodeling an old building. The advantages of the former method will be taken up shortly, but it is sufficient to say at this time that, whichever procedure is adopted, the preferable location of the central office building should be on one of the four corners of the intersecting streets at or near which the telephone center is located. This location is the most advantageous for several reasons. First, it permits

*Continued from issue of June 5, 1909.

of a connection from the building to the main distributing leads at a minimum expense; second, it provides a separate means of ingress and egress for employees, thus keeping the part of the building reserved for the public free from intrusion; third, materials and supplies may be handed with the greatest facility, and where the exchange building is made headquarters for line order gangs and installers this feature is of considerable importance. All of these features are not found to be present in the same degree of adaptability in inside lots. The remaining advantage gained by the selection of the corner lot, and probably the most important one of all is the reduction of fire hazard. Continuity of service, to a large degree, depends on the ability of the plant to withstand the action and ravages of the elements, both inside and outside the exchange building, and every effort is made to protect the inside apparatus from possible damage from such causes. The selection of the exchange site is one method of offering protection to the inside apparatus. Where an inside lot is selected the outside exposure to fire hazard consists of the three buildings which adjoin it on the end and two sides. When it is possible to select a corner lot this hazard is reduced to two exposures, and this consideration many times, owing to the construction of inflammable structures in the block, makes a material factor in selecting the exchange site.

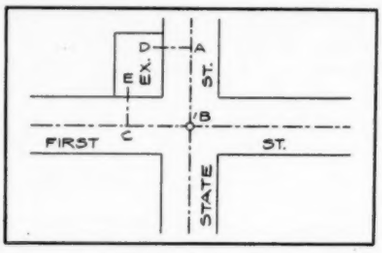


Fig. 9. Diagram Illustrating Method of Entrance to Central Office.

The matter of entrance of the conduit and cables is to be considered in detail when determining upon the exchange location, and the methods pursued in considering this feature are as follows: Fig. 9 is intended to represent a portion of a territory immediately surrounding the telephone center which is designated at *O'*, and with an assumed exchange location as shown, at one corner of the intersecting streets forming *O'*. The dot and dash lines lying in the streets are assumed to represent cable in conduit, which form the two main distribution leads, one on each of the streets forming the telephone center.

In determining the proper location for the entrance to the exchange building when it is located on the corner, it will be seen that two points present themselves, either of which could be used to advantage from the physical standpoint. But in this case, as in most others where two plans present themselves, the factor of cost determines the plan to be retained, Therefore, a comparison of cost between the two logical locations shown at *D* and *E* in Fig. 9 are required. Before attempting this work it should be stated that the entrance to the exchange will not have to be decided upon until the plant is designed, at which time the physical proportions of cable and conduit will be known, and serve as a base for comparisons. In all cases, the capacity of the duct or conduit system is calculated for the maximum or ultimate requirements, and when considered with respect to questions of exchange entrance should be of the maximum capacity. On the other hand the cables installed at the time the exchange is constructed number only those which will be used for the initial installation. Accordingly, when calculating costs for exchange entrances, the maximum number of cables must be considered, and will be obtainable when the plant has been designed. Assume that in the case of Fig. 9, six ducts are needed in First St. West of the exchange, in which, ultimately, five cables will be installed; that five ducts will be needed in First St. East of the exchange, and ultimately, four cables; that five ducts will be required in State St. North of the exchange, and four cables (ultimately); and that four ducts will be needed in State St. South of the exchange in which three cables will be required ultimately. With these assumptions as a basis for determining the comparison between the cost of the exchange entrances assumed to be at *D* and *E* the procedure follows:

The length of conduit and cable required for each distributing run to enter the building at either of the proposed locations will usually determine the economy. Only those distances which affect the entrance of the plant to the exchange need be considered. Sketch *A*, in Fig. 10, shows the entrance length for the plant lying in First St., in Fig. 9, East of the exchange, and the lengths thus required when entrance *D* or *E* is used are as follows:

With *E* as an entrance—
Linear feet of conduit, *C* to *E* = 40 feet
Duct feet of conduit, 40x5 = 200 feet
Linear feet of cable, 40x4 = 160 feet

With *D* as an entrance—
Linear feet of conduit, *C* to *B* to *A* to *D* = 280 feet
Duct feet of conduit, 280x5 = 1,400 feet
Lineal feet of cable, 280x4 = 1,120 feet

Comparing: Entrance *D*, conduit 1,400 duct feet
Entrance *E*, conduit 200 duct feet

Difference .....1,200 duct feet

Entrance *D*, cable 1,120 feet
Entrance *E*, cable 160 feet

Difference ..... 960 feet

Therefore entrance *E* is the most economical for the plant lying in First St. East of the exchange.

Sketch *B*, Fig. 10, shows the entrance lengths for the plant lying in First St. West of the exchange, and the comparison for entrances *D* and *E* is as follows:

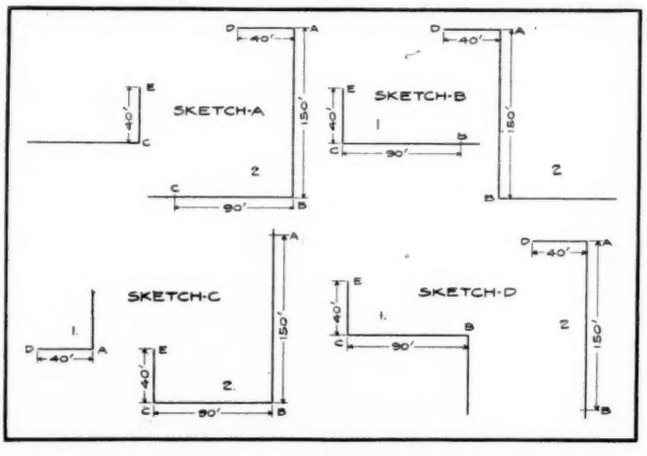


Fig. 10. Diagram Showing Entrance Lengths under Different Conditions.

With *E* as an entrance—
Linear feet of conduit, *B* to *C* to *E*, 130 feet
Duct feet of conduit, 130x6, 780 feet
Linear feet of cable, 130×5=650 feet.

When the cables are brought in with *D* as an entrance—
Linear feet of conduit, *B* to *A* to *D*, 190 feet
Duct feet of conduit, 190x6 = 1,140 feet
Linear feet of cable, 190x5 = 950 feet

Comparing: Entrance *D* conduit, 1,140 duct feet
Entrance *E*, conduit, 780 duct feet

Difference ..... 360 duct feet

Entrance *D*, cable 950 feet
Entrance *E*, cable 650 feet

Difference .....300 feet

Therefore entrance *E* is the most economical for the plant lying in First St. West of the exchange.

Sketch *C*, Fig. 10, shows the entrance lengths for the plant lying in State St. North of the exchange.

With *D* as an entrance—
Linear feet of conduit, *A* to *D*, 40 feet
Duct feet of conduit, 40x5 = 200 feet
Linear feet of cable, 40x4 = 160 feet

With *E* as an entrance—
Linear feet of conduit, *A* to *B* to *C* to *E*, 280 feet
Duct feet of conduit, 280x5 = 1,400 feet
Linear feet of cable, 280x4 = 1,120 feet

Comparing: Entrance *E*, conduit 1,400 duct feet
Entrance *D* conduit 200 duct feet

Difference ..... 1,200 duct feet

Entrance *E*, cable, 1,120 feet
Entrance *D*, cable, 160 feet

Difference ..... 960 feet

Therefore, in this case entrance *D* is the most economical for the plant lying in State St. North of the exchange.

Sketch *D*, Fig. 17, shows the entrance lengths for the plant lying in State St. South of the exchange, and the comparison is as follows:

With *D* as an entrance—
Linear feet of conduit, *B* to *A* to *D*, 190 feet
Duct feet of conduit, 190x4 = 760 feet
Linear feet of conduit, 190x3 = 570 feet

With *E* as an entrance—
Linear feet of conduit, *B* to *C* to *E*, 130 feet
Duct feet of conduit, 130x4 = 520 feet
Linear feet of cable, 130x3 = 390 feet
Comparing: Entrance *D*, conduit 760 duct feet
Entrance *E*, conduit 520 duct feet

Difference ..... 240 duct feet

Entrance *D*, cable 570 feet
Entrance *E*, cable 390 feet

Difference ..... 180 feet

Therefore entrance *E* is the most economical for the plant lying in State St. South of the exchange.

Now, to summarize, we find:

Total conduit, entrance *E*, 200 + 780 + 1,400 + 520 = 2,900 duct feet.

Total conduit entrance *D*, 1,400 + 1,140 + 200 + 760 = 3,500 duct feet.

The results of this comparison indicate that entrance *E* is the most economical entrance for the entire conduit plant. Again, summarizing cable:

Total cable, entrance *E*, 160 + 650 + 1,120 +390 = 2,320 feet.

Total cable, entrance *D*, 1,120 + 950 + 160 + 570 = 2,800 feet.

This indicates that entrance E is also the most economical for the entrance of the entire cable plant. It may sometimes occur that one entrance proves in for the conduit, and another for the cable. In such a case the costs of the conduit and cable must be obtained and applied to the quantities, and the result of this final analysis will indicate which entrance is the most economical.

Turning again to Fig. 9, assume that the dotted exchange site near the center of the block represents an inside lot which is available for the location of the exchange building. In the event that the corner lot cannot be obtained, it will be necessary, of course, to shift the exchange site to the inside lot nearest the corner that is available. If there is a selection between the two, the selection should be made after a careful study of the cost of effecting an entrance for the plant, along the lines just outlined. It may be safely stated that there is always a difference in price between an inside and a corner lot, ranging from 1 to 10 per cent more for the corner lot than for the inside lot. This difference in cost of the property must be balanced against the cost comparisons for plant entrance, and if the total amount of entrance cost, plus lot cost for the corner lot, is less than for the inside lot, it should, of course, be selected. If, however, the reverse conditions exist, it becomes a matter for the management of the telephone company to decide, whether it is willing to pay the difference for the sake of obtaining the advantages a corner lot offers, which have been previously discussed.

(To be Continued.)

Telephone Studies at Ohio State University.

As an illustration of the importance given the subject of college training for telephone employes, the Ohio State University, located at Columbus, O., has sent out a circular to all telephone corporations within the State, calling attention to the facilities afforded by that school in training young men in telephone lines. The circular shows that between the years 1891 and 1904 only six graduates of the college went into the telephone business, but since the latter date the number is trebled.

The telephone course given by the Ohio State University differs from the regular electrical engineering course in that the student in the senior year takes a portion of the work in the direct study of the more technical problems of telephone transmission and operation. This work is not regarded as essential, but simply gives the student more insight into telephone problems and shows how they may be successfully handled in practice. No attempt is made to supply the practical experience which can only be gained by employment by a telephone company in the first six months of work. The aim of the course is to increase the ultimate capacity of the man, and it is believed that this is to no small extent accomplished. The University has a considerable equipment of telephone apparatus.

Operators Rushed from New York City to Richmond, Va.

It has just been reported from New York that twenty-five operators have been rushed from the metropolis to Richmond, Va., on account of service troubles in the exchange at the latter place. It is understood that the arrangement is only temporary, but it seems to establish a record for distance in the transfer of any considerable number of operators.

Telephonic Reminiscences*

By C. E. McCluer

When Mr. Carr, a wealthy tobacconist, the head and front of the opposition, who furnished the capital necessary for the construction of the opposition plant, saw my notification, how he must have laughed! We could not have more greatly pleased him. When a few years later I called upon him in obedience to a suggestion from headquarters, for the purpose of sounding him as to the possibility of burying the hatchet and forming with him a treaty, offensive and defensive, he told me that his first idea in giving out his intention of building an opposition exchange was to force the Southern Bell to accord a reduction of rates. He at first had no serious intention of putting any capital into the telephone business, but felt confident that the mere announcement of such a scheme would frighten the Bell people into a compliance with the universal demand for a reduction of their ante-patent-demise rates. But when he failed to discover any indications of an intention on the part of the Bell magnates to descend from the high steed they were bestriding, he began to entertain the idea seriously. He reasoned that if the Bell managers were so persistently stiff in their demands for the full pound of flesh, there was room and opportunity for a competing system; careful investigation of the subject leading him to believe that at rates considerably less than they were charging he could get the business and hold it, and perhaps make it pay. His idea, however, was not to go into the business as a commercial or profit-paying enterprise, but solely for the benefit of the town at large, though if he could earn a reasonable interest on his investment he would not object. His only fear was that the Bell managers would meet his rates and perhaps cut under them a little, and thus be able to hold him in check, if they did not force him to sacrifice his investment. But he finally concluded to risk such an eventuality. When therefore he learned that the Bell concern was going to give an entirely free service, he rejoiced in the knowledge that even if the people did retain the Bell telephones, they would willingly pay him his reduced rates, and the more willingly and gladly because by thus doing they were securing all the benefits of a double service at the expenditure of a single rate, and that rate much lower than the Bell monopoly had been exacting for many years.

When it finally percolated through the heads of the Boston people that there was something wrong with their Selma and Durham policy, and that it was not panning out as intended, I was asked to do what I could toward amending matters. When I approached the Durham people for the purpose of securing compensation for future service, they laughed at me. As the local organization had been instrumental in securing for them such superior telephonic advantages, they would not desert it; and as the Independent exchange boasted as many, or even more, subscribers than the Bell, and its service had gotten up to a satisfactory plane, they could do without the Bell telephones now. As long as they cost nothing they were willing to keep them, but if we proposed to exact even a merely nominal tariff, there were the telephones on the wall. We could take them down and welcome. So the status of affairs remained unchanged until after I had severed my connection with the company.

The same brilliant scheme was tried at another of my exchanges, Huntington, W. Va., shortly after it was inaugurated at Durham, with identically the same result as far as regards the many years' experiences of a plethora of expenses unassuaged by a single glint of a golden harvest. I wish I knew just what amount of the coin of the realm was squandered in pursuit of this ridiculous scheme of competition at Selma, Durham and Huntington. It must have been considerable. Just think a moment. Five or six, it may be seven or eight years' exchange service, with the necessary accompaniment of expenses of operation and maintenance, in towns the size and importance of those three, without even the faintest odor of revenue to delight the heart of the treasurer! Is it any wonder, in view of such extravagant and ruinous policies followed for many years, that the Southern Bell has been compelled to draw on the parental kitchen all this time for subsistence?

In further illustration of the stolid obstinacy displayed by the Southern Bell officials in the maintenance of their exchange and private line rates, after the expiration of their patent monopoly, I quote from several other letters of that period. In the closing months of 1893 I began to sound the New York people as to their future policy after the telephone field had been thrown open to all comers by the lapsing of the fundamental telephone patents. But I secured very little information and practically no satisfaction whatever. I elicited enough, however, to justify me in the assumption that a waiting policy was to be adopted. Nothing was to be done to alter existing conditions unless under compulsion. That policy I believed to be injudicious and inimical to true telephone interests. I therefore labored to secure a more liberal plan of action, one that according to my judgment would entrench the existing Bell organizations against the attacks of rival or opposition enterprises, which I felt sure would come. I first took up the subject of "private line" rates, because it was from our private line subscribers that I received the first inquiries as to the effect the approaching demise of the Bell patent would have on our charges for private line equipments. Under the erroneous belief that the courts would sustain the validity of the Berliner transmitter patent, they all expressed a willingness to continue to pay the rentals on the battery transmitters if we would allow them to buy outright the receivers and magneto call boxes. Under date of March 1, 1894, I referred to Gen. Supt. Carson a communication just received from a Mr. Amos, with the following reference thereto:

"I really think some action ought to be taken to enable us to retain our private line subscribers. They are becoming very restless and unless we allow them to carry out Mr. Amos' suggestion, to rent our transmitters and buy our telephones, I fear they will shortly throw out all our telephones."

On the following day I had this to say:

"I regret that it is not possible for us to sell telephones and continue to rent transmitters. . . . All of our subscribers will operate their lines with magneto transmitters as far as practicable and I greatly fear that many infringing transmitters will be introduced and used in place of our transmitters."

Nothing being done in the meantime in this direction, I wrote again over a month later, under date of April 9th:

" . . . While we are all sanguine as to the result of the government suit to annul the Berliner patent, the decision may possibly be adverse. . . . Just now, people will buy from us more quickly and at higher prices than from other and untried manufacturers and agents, and we could undoubtedly now build up a selling trade that will otherwise get away from us. I this morning had a call

*Continued from issue of July 17, 1909.

from Telegraph Superintendent Walstrum of the Norfolk and Western Railway Company, who states that it is the intention of his company to equip a few short private lines with magneto transmitters, and their preference is to purchase our instruments. He frankly says that he knows our apparatus, and his preference is to obtain them if we will dispose of them by sale. Otherwise he will purchase from other magneto manufacturers."

On the same date having something to say regarding small town or village exchange systems, I wrote:

"I know that heretofore it has never been considered admissible for us to delegate to others the right to construct, inaugurate and maintain telephone exchanges, but circumstances are changing and we should change with them. . . We would thereby secure an interest in such exchanges without the investment of a single cent, and our profits would doubtless be greater from the sale of the equipments and the rentals of the transmitters alone, than they would be if we owned and operated the exchanges ourselves. . . I believe that exchanges will be established in these small towns sooner or later, whether we have anything to do with them or not, and in my opinion it would be better for us to be interested in them to the extent of securing the rentals from the battery transmitters, than to allow outsiders to establish and operate exchanges without reference to us."

While on the subject of village or small town exchanges I may as well record the fact that during the closing months of 1893, or possibly it was during the early months of that year, I became impressed by the fact that the smaller towns of my territory had never enjoyed the benefits of a telephone exchange. Not because such facilities had not been offered them, but simply because of the fact that I was authorized to offer them only the same scale of rates that were in evidence in the larger cities, and those rates were too high to justify acceptance by the villagers. Until the expiration of the Bell patent I never could secure an exchange rate lower than the $50 and $60 quarter mile residence and business rates which were exacted everywhere without regard to the size of the place or the number of patrons. I worked up several small exchanges in my territory at the standard city rates by securing meetings of the business men and appealing to their patriotism and town pride, as I had originally done at Lynchburg, but they never amounted to anything. Newberne, N. C., was a case in point. Newberne was then a small fishing village on the North Carolina coast. Some enterprising citizen wrote me regarding the possibility of establishing an exchange in the village. From the mayor I secured the privilege of using the council chamber for a meeting which I called. At the appointed hour quite a crowd of the business men of the place had congregated, and I experienced no difficulty in securing signatures for twenty-five or thirty stations. Within a couple of months I visited Newberne again and inaugurated the service.

At the end of the first twelve months I ran down to Newberne again, to secure renewals of subscriptions, scarcely an additional subscriber having in the meantime been added to the number I had originally secured on my first visit. Nor had I ever received any complaints about the service. But to my astonishment and chagrin, while every one of the subscribers expressed himself as being perfectly satisfied with the service, one and all declined to sign a renewal contract unless I would greatly reduce the annual charge. That I was, of course, powerless to do, but the circumstances were laid before the New York officials, who refused curtly to authorize any reduction, and I had the disagreeable task to perform of dismantling the exchange and abandoning it. At rates that are now current in such places I might have saved the day, and the Bell people would have still been in control. The opposition got it eventually, and, I believe, are still holding it.

Profiting by several such lessons, I concluded that in order to serve the smaller towns and villages in my territory, I would have to adopt some plan that would enable me to offer them much lower rates than were then current. Our executive officers appeared to be perfectly indifferent as to these unimportant settlements, and refused point blank to consider a lower scale of rates for them, claiming that they could not afford to construct and operate an exchange at anything less than the standard rates of $50 and upward on account of construction, equipment, and maintenance and operating expenses, principally the two latter. I began therefore to cast about for some scheme for reducing the cost of maintenance and operation and finally hit on a "direct" connection or "village" system that provided for the use by the patrons without the intervention of the usual manual switchboard and other central office appliances, and especially the dimity and calico divinities that were wont to preside over the central office appurtenances. I worked out such a system thoroughly, made drawings and specifications of the apparatus and connections, and estimates of the cost of construction and maintenance, (there would have been no operating expenses), and then submitted the scheme to our general superintendent with a recommendation for its adoption. After a time the data were returned to me approved, with instructions to submit estimates and requisitions for such a direct connection system to be installed at Fredericksburg, Va., at rates considerably lower than the standard. I was told that my drawings and specifications had been submitted to the American Bell officials and passed upon by their engineers, one of whom made the admission that my scheme was good! So good in fact that it rather discounted and discredited the standard manual systems as to celerity and reliability. That made me feel good and I at once began to pave the way for the first direct connection system of my devising, to be installed in the historic old town of Fredericskburg. But, to paraphrase a solemn adage, subordinates propose, but presidents and general managers dispose! Before I could submit my estimates and requisitions, in fact within a day or two, here came a revocation of the authority to construct a direct connection system, and that was the last of it. Fredericksburg and a whole lot of similar towns were foolishly left unoccupied for the especial benefit, as it afterward proved, of the opposition.

My direct connection scheme provided for a simple thimble and plug switchboard (costing but a few dollars) for each station, with a single straight-away cable of fifty or a hundred wires and a common return of liberal conductivity, connected to each board in such a manner that any station in the system could at will call up and talk with other station on a purely metallic circuit. And such a system could have been run up to several hundred stations without undue complication or unwieldiness. I am aware that some such system was unsuccessfully tried in New England in a half hearted way. Such a patented system stood in the way of a patent for which I applied for my device, but there were variations in my scheme that differentiated it from, and made it superior to, the patented system.

About this time the rates and methods of the New England company were held up to me as a pattern which I should endeavor to emulate. Under date of April 10, 1894, I responded in this wise:

". . . In response to yours of above date therefore I will only say that New England, with its network of short toll lines between closely contiguous towns and cities, and with its teeming population, is a much better field for

the exploitation of the New England company's ideas than our sparsely settled territory with its magnificent distances and occasional toll lines. . . . In fine I apprehend that our adhesion to the example of the New England company will drive customers away from us, and we will soon be out of the private line business entirely. . . . I really do not think it will be practicable or judicious for us to adopt in our territory the rules and regulations which the New England company is able to formulate and enforce in its territory."

After much agitation and importunity in favor of a voluntary reduction of our monopolistic rates on the date of the cessation of our monopoly, and after having, as I fondly imagined, made a faint but perceptible impression on the calloused intellects of our northern masters, I was asked if in my opinion a reduction of $1 per quarter or $4 per annum from our existing rates would not satisfy the demands and expectations of our patrons. To this evidence of monumental liberality I respectfully replied under date of April 5, 1894:

"I really do not think that a reduction of $1 per quarter in the exchanges you mention would be satisfactory to our subscribers, nor do I believe that any moderate reduction like that would have an effect favorable to our company in connection with opposition schemes. We should do no less than accord a reduction of at least $5 per annum where the magneto rates are now in force, and of $10 per annum where we are now receiving our current Law system rates. . . . In view of the expiration of the Bell patent, the public expects a material reduction in our telephone exchange rates, and unless we do something to meet this public expectation we may as well prepare ourselves for a considerable amount of agitation about opposition exchanges."

Here is just one more, of June 30, 1894:

"Please do not think that I am demoralized, for I am not. I cannot, however, help but think that the time will come when we will find it necessary to reduce rates at Richmond and Norfolk under compulsion, and I firmly believe it will be far better for us to make such reduction now when we can gain some credit for it." (And then seeing that my arguments had not met with the approval of the Bell officials, and that they were becoming restless under my importunities for the adoption of a liberal policy so foreign to their views, and concluding that I had better become a little more politic if I did not desire to lose my job, I added): "You understand I am going to carry out the policy indicated by you without regard to my individual opinion, in the future as I have done in the past. I only give you my views as I conceive it my duty to do."

I leave it to the decision of any unprejudiced observer—did I not prophesy aright? Can I justly be charged with the loss of the Richmond franchise, the entry of the multitudinous opposition schemes, and the serious losses to which the Southern Bell was subjected subsequently, in consequence of their short-sighted policy? Well, that is just what they have attempted to do. The American Bell officials have not only attempted to discredit and boycott me because of my twenty years' faithful service with the Southern Bell company, which chanced to be detrimental in some respects to what they conceived to be the interests of their organization, but they have done all they could to saddle me with the responsibility of the glaringly serious errors which have cost the Southern Bell so dearly, making of me a scapegoat for their sins of omission and commission. The policy that eventually made it necessary to furiously slash their rates and even give free service in order to fight and cripple the myriad of opposition schemes that cropped up in consequence of their actions, and which later necessitated the purchase of many of the opposition plants at extravagant figures, was dictated from Boston. A policy that would doubtless have prevented such catastrophies was suggested from Richmond, but sat down upon and squelched by superior Bostonese intellect and judgment.

(*To be Continued.*)

History of the Automatic Telephone*

The Lorimer System—Continued

By Arthur Bessey Smith

Departure from Old System.—Since the Lorimer brothers had been working with the Troy, Ohio, exchange they had been impressed with the futility of trying to make an automatic switching system on the plan there used. The troubles encountered, with the proposed remedies, are as follows:

1. The individual switches gave endless trouble. Hence, have none of them. Let their circuit shifting duties be performed by apparatus which is a part of a division.

2. The circuit selectors got in line with each other so that several might be seized by one line, thus reducing the chance for other people to talk, or, in certain cases, tieing up the whole plant. It was now proposed to have the circuit selectors normally at rest. The remedy also involved a constantly rotating device, called a division starter, whose duty should be to detect a calling line, and start out one circuit selector (part of a division) to find it.

3. The numerical separator could not be made to give satisfaction. Hence, do away with it. Let the impulses come in over one wire and ground, while the other wire and ground form a circuit for controlling the action of the signal transmitter (at the substation). By this means the second or third set of impulses may be held up positively till ready for them.

4. The fact that each circuit selector had to contain around its edge terminals for all the lines in the exchange limtied the size of the system. The Lorimer brothers proposed to have the switchboard built in sections of 100 lines each, so arranged that calls would be trunked from one to the other. Further, it was their object to make the section the unit, adding sections as the exchange grew.

Fig. 133 shows as nearly as possible the scheme worked out to do away with individual switches. It is the apparatus which was set up in the spring and summer of 1897 to demonstrate to Mr. Neill, the manager, that their ideas were feasible. The sub-station is an adaptation of that used at Troy, with the addition of a trip magnet, *T M*, to control the movement of the impulse brush, 32.

The preminminary impulse receiver consisted of a stationary commutator, 4, having as many segments as there were lines in the exchange. Line No. 1 of each subscriber's line was to be wired to its own segment. The stop

*Continued from issue of July 10, 1909.

relay, *S R*, was wired between positive battery and a constantly rotating brush, 2. The stop relay, *S R*, by means of its contact, 1, could energize its own stop magnet, *S M*, and the division starter relay. The former operated a clutch and bolt, by means of which it could disconnect the brush, 2, from the power shaft and stop it on any desired segment. The division starter relay energized the operating magnet of another apparatus called the "division starter." This consisted of a cylindrical arrangement of contacts, with a set of wipers on a shaft rotated inside. The operating magnet, *O M*, stepped the wipers forward.

The rotary switch was a similar cylinder of contacts, but the brushes or wipers were adapted to be moved by a power driven shaft, which a clutch magnet, *C* M_2, could connect or disconnect.

The primary connector was similar to the rotary switch, except that very special means were taken to insure quick and accurate stopping of the wipers. The bolt, 27, was held normally in a notch of a wheel, 26, by spring pressure. The clutch magnet, *C* M_1 could pull the bolt, 27, out and thus allow the wipers, 22, 23, etc., to begin to rotate. A dog, 28, then snapped to catch and hold the bolt out till released by the bolt release magnet, *B R M*. To the bank contacts, 24, 25, etc., were wired the subscribers' lines.

The action was as follows: To send in a call a lever or chain at the sub-station was pulled down. This wound up a clock spring, and also moved brush, 32, onto the first pin, 31, of its bank. This grounded Line 1. At central brush 2 is continually revolving and in course of a fraction of a second strikes segment 3, to which Line 1 is connected. At once the stop relay, *S R*, is energized, which energizes the stop magnet, *S M*, and the division starter relay. The former stops the brush, 2, on segment 3, the latter starts the brushes of the division starter. As the two bridged wipers, 6 and 7, of the division starter move over the contacts, 8 and 9, they close a circuit as follows: from positive battery through *C* M_1, to negative battery, which is grounded. This pulls out the bolt, 27, of the primary connector, locked by dog 28 and immediately the wipers 22 and 23 start to find the calling line.

The bolt has closed a contact, 29, from negative battery which sends current through contact 17, brushes 11 and 10, and contact 16 or the rotary switch (normal position) to stop relay, *S R*, thereby locking the brush, 2, in its position. Bank contact 25 of the primary connector is the one connected to Line 1, and is the one which will determine the identity of the calling line. It will be noticed that normally this point is open. But since a call has been initiated, point 25 and Line 1 have been "dead" grounded by the contact 29 through the brush 2. Thus wiper 23 is hunting a "dead" ground, where it will stop.

Following the wire attached to wiper 23, we find that it runs to contact 20 of the rotary switch, through bridged brushes 14 and 15 (normal position) to contact 21, from where it goes through *C* M_2 and *B R M* in parallel to positive battery. Hence, when wiper 23 strikes the ground on 25, both magnets will be engerized. The bolt release magnet, *B R M*, lets the bolt 27 shoot into a notch, stopping the wipers, 22, 23, etc., on the calling line. Contact 29 is opened so that the brush, 2, of the preliminary impulse receiver can start again on its rounds.

The same current that energized the bolt releases magnet also pulled up the clutch magnet, *C* M_2, which started the rotary switch wipers on to their next stop. While the bridged brushes 12 and 13 wipe over contacts 24, Line 2, through the trip magnet, *T M*, to ground. This releases the clockwork so that the brush 32 is made to travel forward, sending in a series of impulses over Line 1.

As the apparatus was not designed to make complete talking connections, no further work on it was done, except to make drawings of the apparatus and circuits, which were completed in August, 1897. On testing this rudely constructed apparatus the results were so satisfactory that plans were at once laid for building a larger model to handle complete connections. The shop was moved to

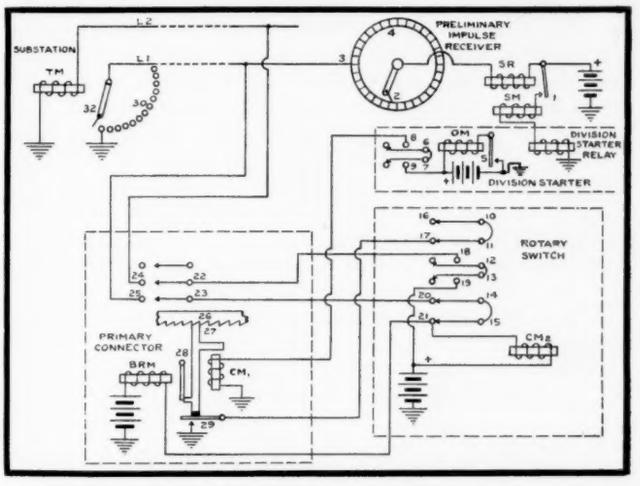


Fig. 133. Lorimer's First Plan for Doing Away with Individual Switches.

the Orr Building, on the corner of Wayne and Sycamore Streets (Piqua, Ohio) where a working model was completed. Its preliminary impulse receiver had four segments, but only three lines were connected.

Interwoven with the endeavors of life we may find many a romance, hidden from general view. The world sees only the struggling inventor, gradually perfecting his machine. But the inventor is a man. To him, his invention is often more than a machine. Its success may bring with it the realization of other dreams, perhaps the establishment of a home. It is significant that on the 26th of October, 1897, George W. Lorimer was married.

This exchange for four lines, three of which were connected, had the following parts, which it may be well to remember: Sub-station set, preliminary impulse receiver, division starter, rotary switch, and primary connector, all of which were part of the first outfit, made for demonstration only. In addition to the above there were the following: secondary connector, totalizer, a hundred's register, a ten's register, a unit's register, an interconnector, a signaling relay, a busy call relay, a release relay and a secondary connector controller.

The interconnector is worthy of special note, for it corresponds to a selector in its functions. After the hundreds register, by a series of impulses from the sub-station, has been stepped around to the position corresponding to the desired hundred, the wipers of the interconnector commence rotating and stop automatically when they have reached a non-busy trunk. This is a very fundamental action, for without it a large exchange could not be operated.

On the successful test of this first exchange, considerable machinery was bought and work commenced on a larger exchange to accommodate twelve lines. Two divisions were completed and tested out March, 1898. It worked perfectly, and for a long time was kept in use from one part of the factory to another. As no patent had been applied for, the place was carefully guarded and no public demonstration given, though interested people were shown its operation. At once they started to make eight other divisions, which were completed in the fall of 1898 or spring of 1899.

(To be Continued.)

ENGINEERING SOCIETY LIBRARY

Electrolytic Corrosion of Telephone Cables*

By Elam Miller

The electrolytic corrosion of telephone cables, due to direct current electrolysis, has been experienced ever since the general introduction of the electric traction system with a track or ground return. Telephone systems in the larger cities have underground plants covering extensive areas which are generally coincident with the principal areas covered by the traction system. The leakage of some current from the track to neighboring underground metallic structures, particularly water pipes and lead cables, even under the best conditions of track bonding, is a condition that has been shown must be accepted as unavoidable, and if preventative steps are not resorted to, corrosion of such structures results.

An examination of a table of the electrochemical equivalents of elements will show that lead is more susceptible to electrolysis than iron, in fact, assuming a valency of 2 for both metals, which holds in the more common compound of these elements, lead is approximately 3.7 times more susceptible to electrolytic action than iron. Accepting as unalterable the fact that more or less current is certain to stray from the track returns to the lead sheathed cables of the telephone companies, studies of a more or less elaborate nature have been made to determine the conditions most favorable to electrolytic action on such cables and methods of relief have been fairly definitely outlined. It was at first thought that trouble need not be anticipated where the cables were negative to the track or to paralleling metallic structures, such as water pipes, from which current might flow to the cables, and as a general proposition this is true. It has, however, been shown that where a large amount of current flows to the sheaths, there is danger of injury to the cable through the action of alkaline substances formed about the cable through the decomposition, by the current, of the soluble salts contained in the surrounding earth, these alkaline substances being capable, under favorable conditions, of attacking the cable chemically when the currents are shut off or very much reduced, as would be the case at night. In general, however, the points to be feared are those where the current tends to leave the cable for other conductors in the immediate vicinity. The amount of lead dissolved per ampere-hour by direct current electrolysis is 3.858 grams, and as the maximum thickness of sheath for full sized (2 11/16 inches) telephone cables is but one-eighth of an inch, and further, as the contact area of the sheath from which current is flowing may be restricted, the resistance low, and the current density consequently high, a relatively small amount of current flowing from the sheath for a sufficient time will inevitably result in a perforation. Further, the action has been shown to be not entirely electrolytic, but where, in the soil, nitrates predominate, the corrosion is greater than the theoretical electrolytic corrosion calculated from the electrochemical equivalent of lead, due to the chemical attack of the nitric acid which is liberated by the passage of current. Ordinary city soil contains a large percentage of nitrates. As all modern telephone cables are of the dry core types the result is an admission of moisture to the paper core with the consequent loss of, in most cases, a section of rather expensive cable, and what is probably of greater importance, a serious interruption to the service.

As the corrosion of the cable sheath is in general due to the passage of the foreign return current from the sheath to the earth where the cable is in contact either with the damp porous concrete of a manhole or with the damp sides of a saturated duct, the cable may obviously be protected either by preventing the passage of current into the sheath or by preventing the current from flowing from the sheath. The former method would require the insulation of all cables throughout their entire length, including the manholes, and is absolutely impracticable. The latter consists in providing conductors between the grounded power terminals and the cables sufficiently low in resistance to reduce the potential of the cable sheaths to a point where they are no longer positive to their surroundings, and consequently current cannot flow from them to the earth. Another expedient which has been resorted to is making insulated joints in the cable sheath for the purpose of breaking the continuity of a long cable, and preventing the picking up of current at one point and its distribution at another. This, however, is an expedient of questionable utility and is not in general to be recommended.

In making an electrolytic survey it is of the utmost importance that the condition of an underground cable system, with respect to the potential of the cable sheaths to water mains in the immediate vicinity of the cable, the sides of the manholes and the earth adjacent to or within the manhole, be determined at various times during the day, notations also being made of the volume of traffic on the street railway system at the time of the potential observation. An electrolytic survey consists of a series of such observations made at all manholes where conditions are thought to be critical and the results of these observations plotted on maps of the underground cable system, on which are also shown the traction company's lines and locations of power houses. All of the underground cable sheaths of a telephone system are usually bonded together in the office manholes and bonds between all cables are placed at frequent intervals along the main runs. Where an electrolytic survey indicates a positive condition of the cable with respect to adjacent underground structures or the earth, bonds are occasionally run to such structures. In general, however, a study of the potential chart will show that areas where the potential of the cable sheath is positive to the earth are nearest the grounded terminal of the foreign source of current. This indicates that the sheaths of the cables are acting as return conductors for the grounded power system and to complete the return to the grounded terminal of the power generators, the current leaves the sheaths and passes through the earth. It is, of course, evident that this is the condition which it is desirable to prevent. The method usually adopted to accomplish this is to provide a path of low resistance from the cables to the grounded power terminal by a heavy conductor; never by bonding to the rails of a street railway system, as such an arrangement would give rise to difficulty in the event of broken track bonds or changes in load, of which no warning would be given.

The size of the conductor to be connected to the grounded power terminal and its point of attachment to the telephone cables should be such as to render negative the district shown on the potential map as positive. The actual size of this conductor is usually determined by experiment, as there are so many variable conditions that any attempt to calculate it would be a waste of time. The conductor must be large enough to bring about the de-

*A paper read before the San Francisco Section American Institute Electrical Engineers, June 25, 1909.

sired results of rendering the sheaths of the cables in the danger area negative, but at the same time should not be unnecessarily large so that more current is conducted through the cable sheaths than need be, as this tends to increase the chemical corrosion to which attention has been called. Where the circuits of the electric traction system are arranged with return feeders, it may be necessary to treat the return feeder grounds as so many distributed power houses. Complications may also occur where there are a number of power houses that may be run at different times. Under such conditions, the connections from the telephone cables to the power houses should be so arranged as to ensure the proper relations of all cables to their surroundings under any combination of sources of current supply that the electric railway company or companies may employ. This can only be accomplished by frequent and careful potential observations in a district that has been determined as dangerous from careful surveys.

I believe it may be safely said that it is the feeling today, at least among telephone companies, that they are able to cope successfully with direct current electrolysis. It is, of course, true that some damage is done each year to the underground plant from this cause, but with a fairly frequent system of potential observations, this can be reduced to a minimum. The worst condition with which we have had to contend is a change in the method of feed adopted by the traction system and the installation of new substations. If advice could be immediately obtained of both of these conditions, precautionary measures could be taken that would render our system practically immune from electrolytic corrosion by direct current. I have in mind a rather serious case of electrolytic corrosion that took place in one of our larger exchanges some two years ago as a result of a rather general change in feed of the traction system. In this instance all of the damage occurred between the visits of the inspector, which were not over three months apart.

In order to guard against changes of this sort, we have considered the advisability of bringing certain cable pairs through the lead sheath at critical points, attaching one wire to the sheath and the other to a ground connection in the manhole. The office ends of these pairs are then connected to a row of jacks at the wire chief's desk, in conjunction with which may also be associated small reverse current relays to operate either a visual or audible signal. Such an installation, omitting the reverse current relays and signals, has been made in one of the medium sized telephone exchanges in California, and it is thought that the insurance against electrolytic action that it certainly affords is well worth the cost of installation and fixed charges on the cable pairs. An electrolytic survey in this particular exchange is made as a matter of routine each day by simply plugging into the jacks with a voltmeter.

With the advent of the single phase road it was thought, in that the methods applicable to the prevention of corrosion by direct current electrolysis would evidently not apply with alternating current since the potential was periodically reversing, serious trouble might be anticipated—the thought being that the effect of the flow of current from the cable would not be entirely overcome by the flow in the reverse direction, particularly at low frequencies. An apparently very thorough investigation of the question of alternating current electrolysis undertaken by Mr. J. L. R. Hayden, and published in the *Proceedings* for March, 1907, indicates that the action of the positive half wave is not quite overcome by the action of the negative half, but the difference is so small as to hardly exceed one-half of one per cent of the electrolytic action of an equal direct current. Mr. Hayden also outlines what appears to be a most effective preventative method. This consists of the superimposing upon the stray alternating current of an extremely small direct current, in the tests made by Mr. Hayden a direct current as small as 1.5 per cent of the total value of the stray alternating current afforded complete protection. To quote from Mr. Hayden's paper his explanation of the protective action of the small direct current is as follows:

"Since electrolytic action of the alternating current appears as a small difference between two large and nearly equal quantities, the action of the positive and of the negative half wave, a very small variation in the action of either half wave makes a very large difference in the result, and this probably accounts for the very large variation in the electrolytic action of alternating current compared with the constancy of the electrolytic action of direct current.

"Regarding the protective action of a small direct current, against alternating-current electrolysis, it must be understood that this is not due to maintaining the lead negative against the ground. It is obvious that the lead would be protected against corrosion, if upon the alternating current a direct current were superimposed sufficiently large to maintain the lead always negative. This, however, would require a direct current more than 2 times the alternating current, which is not practical. From the previous tests, it appears that a direct current of 1.5 per cent of the alternating current gives practically complete protection against the electrolytic action of the alternating current. Such a small direct current would not appreciably change the duration of the successive half waves of alternating current, but the lead would still be positive for practically half the time; and with such a current graphically superimposed upon the alternating current, the eye would hardly see the difference in size of the two half waves of the resultant current.

"It seems that a very small increase of the negative half wave over the positive half wave of the current is sufficient to make the negative half wave completely reverse and thus neutralize the action of the preceding positive half wave."

I should conclude from this that serious trouble need not be anticipated from the alternating current electrolytic corrosion if proper precautions based on these facts be followed.

The Importance of Independents Purchasing from Independent Manufacturers and Supply Houses.*

By Henry A. Clark.

Our business, the telephone business, is different from any and all other kinds of business, and it is hard to compare it with any other.

The telephone business of this country is divided into two great branches, one commonly known as the Bell, which is operated, you may say, as a unit, and controlled by one company; the other known as Independent. The keystone to the great arch of the Bell interests is its toll lines and its one great manufacturing plant.

The opposition to this great company is a great number of organizations, consisting of toll line companies, exchange companies and manufacturing plants; co-operating not as a unit, but from a mutual standpoint, and holding together from and by mutual interests. Our interests are the same and our business partakes largely of the nature of a partnership. For instance, if the Columbus Independent company adds ten telephones to its system of exchanges, it adds a little to the value of every Independent telephone exchange in Ohio; if it loses ten telephones it injures every telephone plant in Ohio a little. If the United States Telephone Company strings ten miles of circuit on its poles where it is needed, or adds

*A paper presented at the convention of the Ohio Independent Association.

one toll station or exchange to its lines, it adds value to every Independent exchange in Ohio.

If one of our great manufacturing plants fails or goes out of business, it injures every Independent exchange and every Independent company in this country, as it would make one chance less for competition in obtaining material. It would take from the field of our industry men with inventive genius, who are now turning out improvements and labor-saving devices for us, and whose energy would then be turned to other channels, and even if not added to the forces of the opposition would probably be lost to us forever.

Retaliation and revenge should have no place in the human heart, for at least two reasons: First, because it is wrong; second, because it never pays, and no act of the individual personally or incorporated, should ever be prompted by revenge or retaliation.

Then again, never do anything expecting your pay, or any part of it, in gratitude.

If we are correct in this, we should not now refuse to buy telephones and supplies from the opposition because they refused to sell us telephones and supplies ten years ago, for that would smack of retaliation or revenge. We should not now refuse to connect up with the Bell toll lines because they refused to let us connect up ten years ago, as that also would be retaliation or revenge. Then again, we should not now buy telephones and supplies from the opposition because in our particular locality they seem to be the under dog, and apparently need our help, expecting our pay in a few pennies saved, or to get it in gratitude, favors and good fellowship in the future from the opposition, for gratitude is non-existent in perhaps all incorporated companies, and especially so in the great Bell telephone company.

On what line of argument then should we refuse to buy goods from the opposition, or connect up with their toll lines today? Why, on the great broad principle of self-preservation, which is the first law of nature, in self-defense, which is right.

We, as Independents, have taken hold of the telephone business, in many places, not especially to make money, but to bring the telephone to our homes, places of business and towns. We have changed it from expensive luxury enjoyed only by the favored, to an indispensable tool of the business and social world. When the final history of this great utility in all its labor-saving and convenient uses is written up, there will be great honor given to the Independent operators for their great foresight and perseverance in pushing the telephone, not only to the small villages and towns, and not only to the rich and well to do, but into the homes of farmers and the common people of the entire country, making it possible for almost every one to enjoy this great convenience of these modern times.

This was not done or accomplished with the assistance of the Bell telephone company, who manufactured the only telephones and equipment when the Independent telephone movement was born, and who had the only machinery and plants and technical knowledge to do it at that time. It all had to be done without their assistance, and in spite of the very worst and most bitter opposition that they could contrive and command, with almost unlimited funds, and that could be devised by their army of shrewd attorneys and business men.

Now, as operators we must not take, or expect we will get all the honor for bringing about this happy change in reference to this great human blessing. Remember we could never have installed a telephone plant in our town or community, unless we could get telephones and switchboards, we could not make them each for himself, and could not buy them from the opposition. Somebody had to undertake to install machinery and factories and make them for us. Some of us can remember how we were threatened with all kinds of lawsuits and prosecutions if we installed those makes of telephones, switchboards and apparatus, and how nervous it made the men we were depending on to furnish us the money to go ahead with our work. We can also remember how some of the factories who made our equipment came to our rescue with bonds, to indemnify us against loss along that line. Some of us can remember that it brought us great comfort and assistance. We also can remember how some of these same factory companies did defend suit after suit and fought it out after years of litigation and spending many thousands of dollars, and saved us harmless, every one of us, from all attacks and troubles.

This same old company is still here with us that made all that trouble ten and twelve years ago; it has met with no change of heart, and has no love for you or me; it will not sell you anything below cost, unless it expects to reap some advantage therefrom in the future. It is not working for the benefit of all the people now, any more than it was then, but is still working for the same end, viz.: A monopoly of the telephone business and field. It has changed its methods, but the end in view is the same. It is today your business rival, and, I believe, enemy; I hate to apply the last term, but I have been a close observer of their methods and work for the last thirteen years, and can come to no other conclusion. I believe, today, that if they could they would destroy your property and mine to again get the monopoly of the telephone business of this country. They never hesitate, and never lose an opportunity, even now at this late day, to belittle and injure your credit and your work. They are spending great sums of money to this end, in publications and otherwise, and, from conversations had and overheard with their men, I am convinced that their employees, even down to common linemen, in some instances, are instructed by those above them in authority to talk against us, our service and property.

Why then, should we give them comfort and assistance financially by purchasing our material of them or any part of it? We know, or should know, that all we purchase from them is taking from our own loyal houses, who have served us so well in the past, just that much business. We all know, or should know, that Independent factories cannot and will not continue in the business without our support, for the opposition buys no telephones or apparatus from them. We all know, or should know, what would happen to us if all our Independent factories would quit making material and equipment for us.

We, therefore, should never buy any equipment from the opposition, because, first, it is not good business sense to do so; second, it is not fair to our own people, or ourselves; third, they cannot serve us as well. We should buy from our own Independent factories and houses all our materials and supplies, because they are a part of our own business system, and are entitled to our undivided support; their dealing with us is fair, is an open and above-board business transaction, and can have no sinister object at the bottom; they can serve us better, give us better equipment, will extend us all the credit, and more, than we deserve.

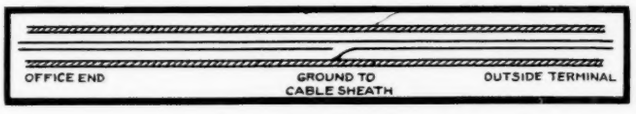
In short, we should deal with our own people for self-defense and self-preservation. I may be wrong, but it does seem to me that any man or company who has been long in our business, and is familiar with the doings of the opposition company, and now will purchase his supplies from the opposition company, or any part of it, is either exceedingly short-sighted in a business sense, which is the most charitable view, or is controlled by self-interests, by some kind of promise of future, perhaps secret, reward, or else is a—well, a mollycoddle.

Letters on Practical Subjects

Locating Ground on Outer End of Open Wire.

A short time ago one of our installers reported that he could not get a ring on a party line telephone he had just installed. On testing the line I found it to be open on one side, yet we had just talked on it.

Another test, with his receiver down, showed the line to



Ground in Cable Caused by Lightning or Electric Light Burn.

be grounded, but the ground would clear up on his hanging up again.

The trouble proved to be a ground in the cable, caused by a lightning or electric light burn.

The wire had been burned in two, leaving it open from the office, but grounded from the outer end.

As this was the only conductor left in the cable, we put our "Wireless" cable tester into service and quickly ran down the fault. As the ground was from the other end we had to connect the sending device from that end, but that was easily done as the device weighs but a few pounds complete with three cells of battery.

Cedar Rapids, Ia. Geo. A. Bishton, Wire Chief,
Cedar Rapids & Marion Telephone Co.

An Old Friend in New Dress—Binding Posts Short-Circuited by Subscriber.

Maintenance men are well acquainted with the unusual when it comes to trouble. All of us have had our hardest case, and have had the satisfaction of finding it. It must be admitted, however, that many of these hard cases were really only simple troubles, but so unusual that they seemed to take on gigantic proportions.

Here is one which required the services of three repairmen, one manager and a bewildered wire-chief. It had to do with a certain line that came in trouble almost daily, and went clear again before the repairman could locate the trouble.

No. 1187 was a telephone in the residence of one of those "important citizens," and when it was in trouble the entire exchange force knew about it. This line would become short-circuited several times a day. The repairman would rush from the exchange the moment it was reported, only to find the circuit "O. K." by the time he reached the instrument. It happened several times that no sooner would the repairman turn his back on 1187 than it would come in with the same old trouble.

The next time this circuit went out of service, Blake was sent out to "get it." Blake went along his line and found that his trouble showed in the house. He was met at the door by Mrs. 1187, who told him that she did hope he would be able to fix her line so that it would stay fixed. Blake had heard this same old cut and dried request before, so he promptly assured the subscriber that the line would be "O. K." within a few minutes. On taking down the receiver he found that he was even ahead of his own promise, for the tester was waiting on the line for him, and demanding to know just where he had found the trouble. On telling the tester that there was no trouble found, he was promptly sent back over his line for a rigid inspection. Blake went over everything; even went so far as to let down his twin drop and examine it, but could find no possible cause of the trouble. As this was about the tenth time this trouble had been in, the circuit was set down for a special study.

A strange thing about the trouble was that on one or two occasions Mrs. 1187 went to another telephone to call the wire chief and report her line out of service. She was held on the line while her circuit was tested out, and, much to the surprise of the tester, was found to be "O. K." She was then assured that she would find her line working by the time she returned home. On both of these occasions the line showed trouble a few minutes after Mrs. 1187 had called in. As usual, the repairman found the line "O. K." on his arrival at the house. The line had worked for almost a week, and it was generally supposed that the trouble had become cleared in some unknown manner. Anyway, the maintenance department did not care to talk about 1187. It was not now in trouble and that was enough. This peace was short, however, for at the end of the week 1187 showed its old trouble. This was too much for the subscriber and nothing would do but that she go personally to the office and complain to the manager. This good lady wanted it understood that the telephone must come out at once, and that she be granted several weeks' rebate. She even went so far as to threaten legal proceedings on account of the trouble and inconvenience the telephone company had caused her. It just happened that the manager was one of the old school, and had "shot trouble" once himself. He called for a test, and found 1187 to be working perfectly. This the subscriber would not believe, and it was only after the shrewd manager had called Mrs. 1187's small daughter to the telephone and let her mother talk to her own house that she was satisfied. The manager then suggested that he drive Mrs. 1187 home and inspect the instrument himself, which suggestion suited her very well. On entering the hall Mrs. 1187 walked up to the instrument, a wall set, and, tossing her handbag on top of the bell box, turned to the manager and politely informed him that if he could fix her line he would be doing something none of his men could do. Just here the manager smiled a big smile, and then frowned. That handbag, a dainty little silver chain affair, was at the moment resting gently across the binding posts of the bell. The 1187 chronic was mystery no longer. After a few round-about questions, Mrs. 1187 explained that she always kept her handbag on top of the telephone because it was so handy; she could always get it on her way to answer the door bell, and settle with the grocery man or anybody else who might happen along for money. There was still one more thing the manager wanted to know about, and the good lady soon enlightened him. When asked if she ever had any trouble with the bell not ringing clearly, she told him that it had not rung clear and loud since it was installed, but she did not mind this, if they would only fix her line so she could always get "Central." She was of course, quite surprised to learn that she was the cause of all the trouble. She was shown just why her line went out of service; that it was a matter of just how far back on the bell box she threw the handbag, whether the line went dead or not; also just why the bell never rang clearly.

To all of this explanation Mrs. 1187 volunteered the information that it was mighty strange how easily some telephones could be put out of service. This was all the satisfaction the manager received, but it was enough.

St. Paul, Minn. Alfred C. Fox.

Needle Short Circuits Transmitter on Milliner's Premises.

The other day I was sent out, on a "Can't be heard" complaint, to a millinery store. Upon taking down the receiver, found I could hear "Central" perfectly, but the transmitter was "dead." When I opened the transmitter and tested for battery there was none passing through the transmitter at all. So I decided there must be a "short"

in the transmitter circuit—probably in the arm. I removed the arm, and in the base found a long needle that had been dropped through the notch in the top, and was lodged with one end against the lug of the insulated conductor and the other end against the arm, thus shunting out the transmitter.

Porland, Ore. P. M. Jenkins.

Real "Bugs" on the Line.

Complaint came from a hotel kitchen extension of a P. B. X. that the bell would not ring. On testing it from the board it appeared to ring "O. K.," but when I went to the instrument and had the operator ring me, all I got was a very faint buzz from the bell. So I got a high stool to stand on, the bell being on the wall up near the ceiling, which just enabled me to reach the bell nicely. I took out the four screws from the front and pulled it out. What happened then simply made me jump backward off the stool, for, without counting, I would estimate that not less than a hundred cockroaches—Pa Cockroach, Ma Cockroach and, in fact, the whole blamed Cockroach family, from the size of the head of a pin to an inch long—fell out of the box, down my sleeves, down my neck and all over me and proceeded to shoot the chutes down my sleeves, loop the loop around my ears, bump the bumps down my spine, and perform all kinds of acrobatic feats in the region of my solar plexus. I am not of a particularly nervous disposition, but the shock from this experience kept me "seein' things" for some time. I had never supposed, up to the time, that there were so many cockroaches in the world. But, to come to the point, that was what was wrong with the bell. The roaches were wedged in so tightly behind the armature that it could not vibrate.

Portland, Ore. M. J. Perkins.

A Broadside from Boston

The Latest Attack Upon the Independent Companies, in the Shape of a Circular Issued by Their Arch-Competitor, Reproduced with Illustrations by Telephony's Cartoonist

What is the matter with the "system" of the Associated Bell telephone companies these days? Everything seemed to be going along smoothly, with the Wall street stock and bond machine running at high speed—when the powers that be tried to put over a few mergers "to improve operating conditions," etc., and, bump! the stock stopped its rise. Somebody must have discovered just then that the A. T. & T. Co. is strong or weak, corresponding to the condition of its "subsidiaries," and that the system has some mighty sick members. To cover up the situation the old cuttlefish spits out a cloud of ink, and presto! we have the Indepndents again advertised by their competitor.

'Tis true, the words in the latest circular sound pretty bad for the Independents—take the following gem—was it from the pen of the mighty Vail, or the astute senator from Massachusetts, Winthrop Murray Crane, high in the councils of the telephone trust and the tariff boosters? It's hard to tell, but here is the sentence:

"In dealing with the telephone situation, Independents, Opposition and Competition have been used as synonymous terms, and all have been considered as competitors of the Bell System."

That is, a word meaning *people* has been used as synonymous with two other words denoting *action*. Well, perhaps so—by someone who is just learning the language! And, again, we read that these three *terms* have been considered as competitors of the Bell System. Truly, this rivals Don Quixote and his celebrated combat with the windmills. If people have thought the Bell System obliged to compete with fierce "Opposition," and old "Competition" himself, no wonder they refused to buy its mortgages. Poor old System—its brain has been affected, and it can no longer think clearly. So it is too bad that it descends to malice—following is the rest of the circular, issued under the title, "Telephone Competition, Opposition and Co-operation," by the American Telephone & Telegraph Company, Information Department:

"When it is considered what a telephone system is and what it stands for, it is clear that an Independent is not necessarily a competitor, and that opposition does not mean competition.

"To properly meet the present-day social and business requirements of the public, a telephone system must be comprehensive. That is, every one desiring service must be connected with the local or territorial exchange or system, and with the outlying districts by toll or rural lines, thus reaching all members of the community.

"A telephone system must be universal. That is all the local and territorial systems and exchanges must be so bound together by toll lines and long distance lines that there is ample provision for intercommunication between each community, within the range of existing possibilities.

"In so far as any telephone system fails to meet these requirements to this extent it falls short of satisfying the public. That the Bell System is the only one that at all approaches this standard of comprehensive universal service is admitted. There are systems which cover somewhat more extensive areas, and satisfactorily serve a limited portion of the public, but that they do not reach the standard of the Bell is evidenced in two ways. First, that all persons having extensive business or social interests are subscribers to the Bell System, even though actively interested in another system. Second, by the often repeated notices and public statements of amalgamations and reorganizations of various scattered systems in a comprehensive, universal whole, with millions of capital.

"There were in the United States July 1, 1909, about 24,000 telephone companies or lines or systems, as the United States Census designates them, having in round numbers 6,500,000 stations.

"The Bell System proper, comprising the 30 Bell associated operating companies, has by actual record, 3,215,245 stations, and 7,800 connected Independent companies, lines or systems, with 1,500,000 stations, making a total of 4,365,245 stations.

"In the local or territorial area of these companies or systems 1,276,000 miles of toll lines connect the various exchanges with each other, making comprehensive territorial systems. These territorial systems are connected with each other by 456,000 miles of long distance lines, forming a universal system known as the Bell System. Thus the term Bell System stands as a trade mark for universal service.

"It is not, nor has it ever been, the policy of the Bell interests to directly develop the whole territory of the United States. In fact, from the very beginning of the business, the development has been carried out by Inde-

pendent companies working in association with the Bell interests. These original Independent companies have grouped themselves together and connected themselves by toll lines, and these groups have been united to form a universal system by the long distance lines.

"Besides the Bell system, with its nearly 8,000 companies or associated and Independent systems and its 4,400,000 stations, there are 16,000 companies not connected with the Bell system, with an average of about 62 stations to each company. These are made up very largely of small rural companies, associations, or co-operative lines, some so isolated that connection with the Bell System would be impossible. Many of them desire and are seeking this connection, and the Bell interests are seeking to connect with all that can be reached, and have plants of such a character as to make connection possible.

"These companies do not form a system, but in some cases form territorial groups of greater or less extent in connection with each other, or with some of the larger companies.

"Besides these there are over 200 companies which claim to have connected some 1,123,000 stations, an average of 5,000 stations to each company.

"The scattered localities, lack of comprehensive toll lines, diversity of methods, and variety of apparatus make it impossible to form these companies into a system in the sense that the term is applied to the Bell System. Much talk and some little attempt at doing this to the contrary notwithstanding.

"These companies may be formed into three groups:

"Group 1. Companies of less than $500,000 capital, that may be termed legitimate companies, started for the most part to fill a real or fancied want by local interests, conservatively organized and operated. Many of them are not active competitors of the Bell; most of them were started with the belief that low rates were profitable. Some 10 per cent have failed in the last few years, or as soon as the plant is worn out, while most of the others acknowledge that rates must be raised before any profit can be made.

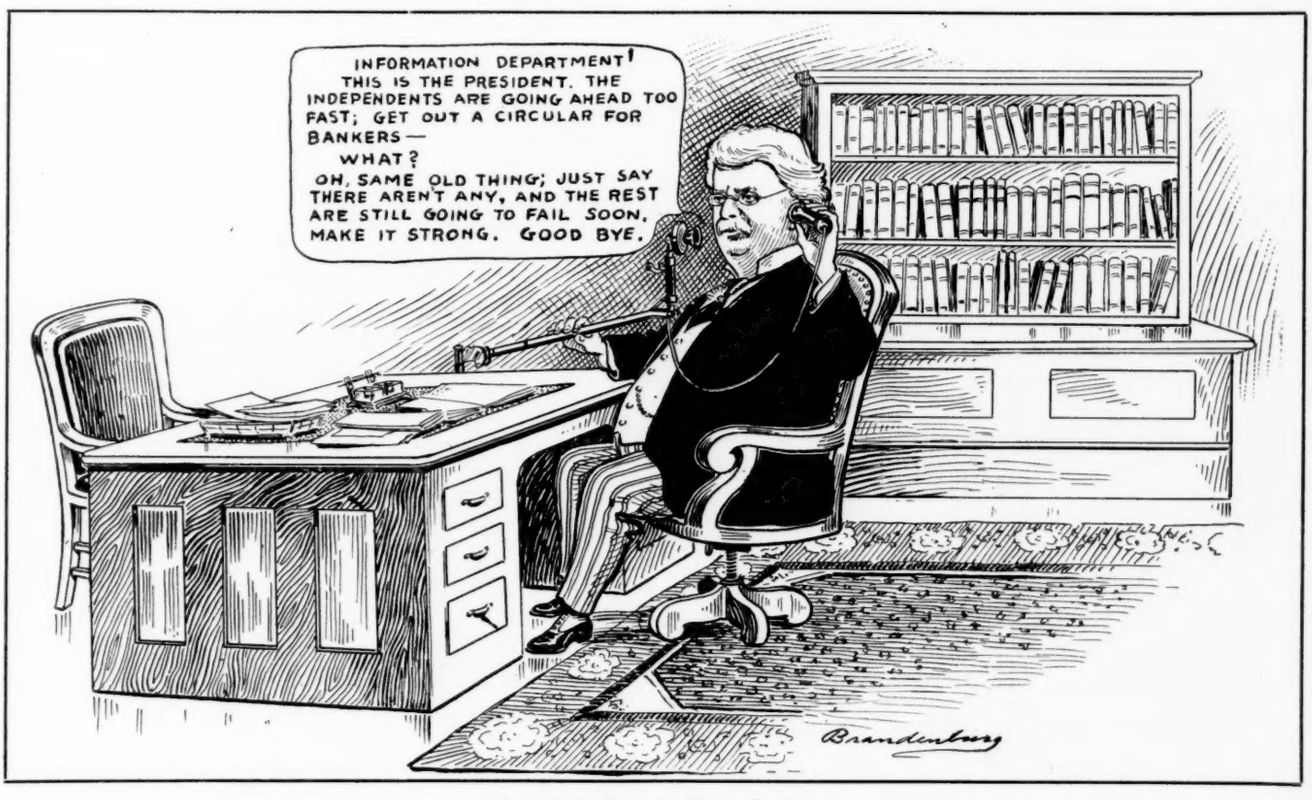
"This group numbers about 150 companies, with total outstanding capital obligations of $25,000,000, and some $250,000 stations, or about $100 capital per station. Not having any considerable amount of toll lines, this capitalization is high, but reasonable.

"Group II. Companies with a capital of $500,000 to $1,000,000. There are 35 of these companies, with a total of $20,000,000 capital outstanding, claiming 108,000 telephones capitalized at $185 per station. Considering that this covers but small proportion of toll lines, it is absurdly large.

"Group III. Companies with $1,000,000 capital. There are 38 of these companies, with a total outstanding capital of $185,000,000 claiming 764,000 stations, or a capitalization of $242 per station. The remarks about over-capitalization above will apply with greater force here.

"Groups II and III comprise what may be termed "promoted companies." That is, companies formed by syndicates, independent of or connected with manufacturing companies, that finance them through construction companies as a rule, and distribute the stock, when possible, to local or outside people. They were not formed to fill any definite want, and were built under franchises promising low rates and large profits,—seemingly a ridiculous proposition, but still sufficiently attractive to have enabled the promoters to distribute something like $200,000,000 (nominal) of securities.

"The history of these groups is similar,—apparent prosperity so long as the plant was new or securities were readily absorbed, then trying or calamitous times, application for higher rates, reorganizations, etc. The percentage of failures in these groups has been from 15 to 20 per cent in the last few years. The probability is that the stations claimed are not what might be called legitimate subscribers.


INFORMATION DEPARTMENT! THIS IS THE PRESIDENT. THE INDEPENDENTS ARE GOING AHEAD TOO FAST; GET OUT A CIRCULAR FOR BANKERS —
WHAT?
OH, SAME OLD THING; JUST SAY THERE AREN'T ANY, AND THE REST ARE STILL GOING TO FAIL SOON. MAKE IT STRONG. GOOD BYE.
Brandenburg

Let Loose the Dogs of War. G-r-r-r-r.

One of the largest companies lately still in process of organization stated to its bondholders that out of over 11,000 subscribers 3,800 had refused to pay and ordered the telephones out, 3,000 could not afford to have telephones and had not paid and 4,200 were paying $30 per year, or less than half the published rates. Few of such companies are paying dividends, and fewer of them show anything earned after taking care of the plant, while most of them are paying fixed charges out of capital obligations.

"As before remarked, over-capitalization, insufficient provision for deterioration of property, in addition to current repairs, low rates, and the lack of intercommunication are slowly, but surely, bringing these companies to grief. The latter alone would do so, independent of any other cause. Intercommunication is the life of our social and business organization, and a universal system is the only one over which comprehensive intercommunication can be had.

"The public are thoroughly imbued with the idea that one system is the best system, but some argue that competition is needed to keep the business within the bonds.

"In these days of official regulation, however, it is questioned whether there is need of competition. Regulation and competition cannot work together. Regulation would demand equal service and equal conditions of each competitor. There is no such competition in the telephone business and to establish such competition is probably impossible.

"But independent of that is there such a thing as competition in the telephone business? To build a telephone exchange in the center of an existing system and give limited service over a restricted area is not competition, at least not the sort of competition that is talked about by its advocates.

"Real competition would mean extending over and connecting all parts of the same territory as is covered by the comprehensive service of the existing system. If competition were necessary or desirable, its benefits should not be limited to a chosen few.

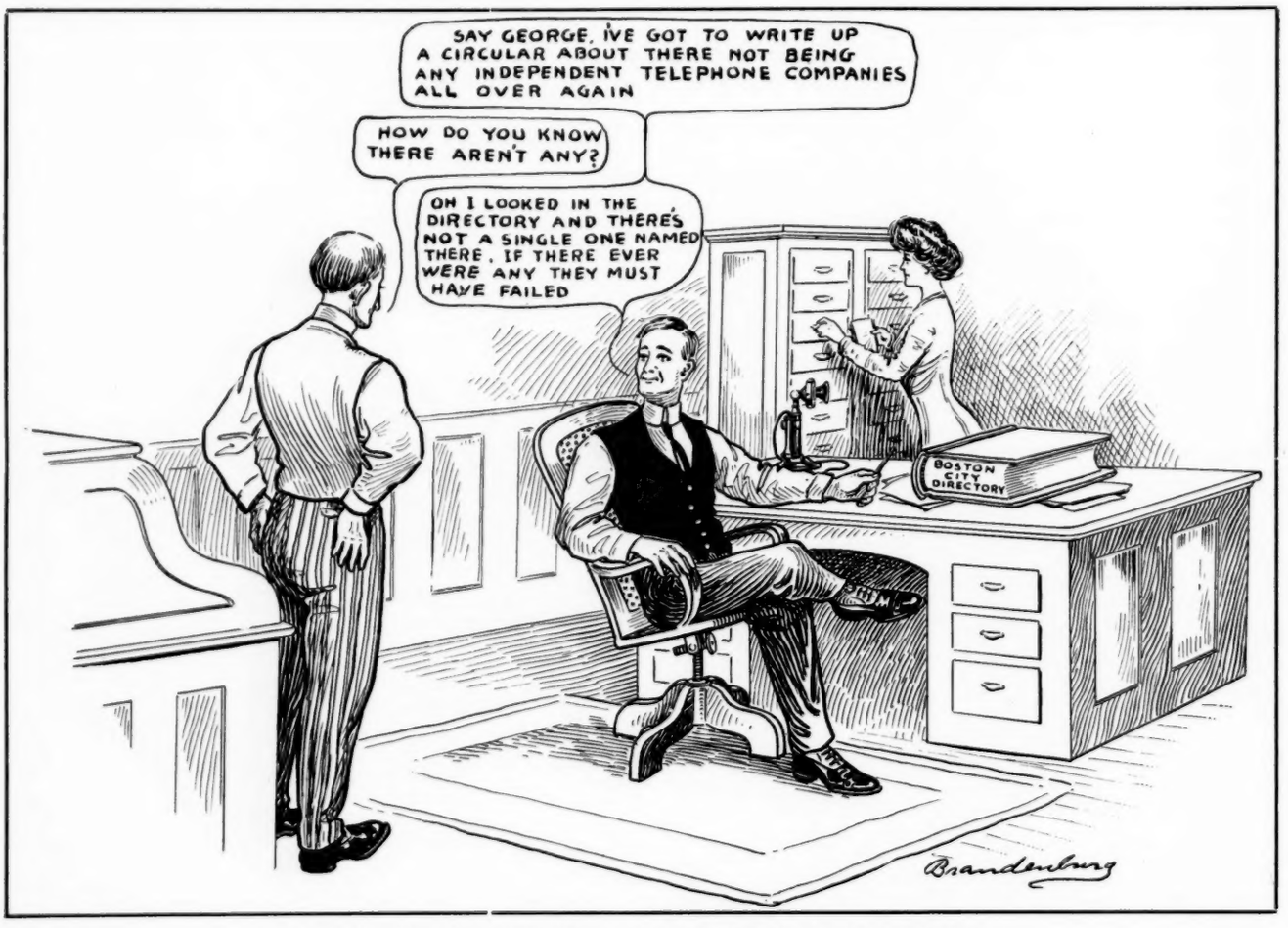
"To build a street railway line on a single street alongside of the line of a system which covers a whole territory and furnished unlimted transfers is not competition. At best such a second line can only divide the business of a very limited area, and in the end public convenience will demand its removal.

"In any public service it is demanded that all portions of the community should receive ample facilities, and telephone service, more than any other, requires complete territorial development.

"The Bell System covers the whole country, directly or indirectly. It meets the need of the whole public, and endeavors to obtain from the whole public a fair average return."

This whole circular is such a composition that one can hardly believe it is authorized, and that the responsible officials of the company are willing to stand by statements as indefinite as most of them, and as untrue as several which are definite.

The discussion of universality is thrown together in a way intended to be plausible, but the Bell telephone company is in a position suggesting that this discussion will be believed only by a few credulous investors in the East, where the telephone system was fairly well developed with-


SAY GEORGE, IVE GOT TO WRITE UP A CIRCULAR ABOUT THERE NOT BEING ANY INDEPENDENT TELEPHONE COMPANIES ALL OVER AGAIN
HOW DO YOU KNOW THERE AREN'T ANY?
OH I LOOKED IN THE DIRECTORY AND THERE'S NOT A SINGLE ONE NAMED THERE. IF THERE EVER WERE ANY THEY MUST HAVE FAILED
BOSTON CITY DIRECTORY
Brandenburg

Information Department Checking up the Independent Telephone Situation.

out the incentive of competition. The statistics compiled by Mr. Ware, of the International Association, for use in connection with the Chicago tunnel franchise question, show clearly enough that the Bell system is not only not universal, but is not predominant in many towns. Similar statistics could be prepared for hundreds and thousands of other towns. Nor could the "System" claim credit for early conceived and uniformly directed attempts to obtain even an approach to, not a universal, but a national service. It is well known that its early policy was toward a restriction of service which kept farmers from having the service at all, and kept it from all users unwilling to pay tremendously high rates. All the circular's statements on this score are indefinite, but their tendency is misleading.

In the discussion of the Census report, the company overlooks the fact that that report brought out clearly that the Independent companies, in the five years since the 1902 report, grew at a rate of 183.4 per cent. As for universality of service, it is impossible to even talk across this country, east and west, or north and south, over the Bell system, to say nothing of transmitting the voice to foreign nations. This is an example of the use of a high sounding word to tell a story which is untrue. Another point is that no telephone subscriber desires universal service. He wants to reach the people with whom his business and social affiliations make it necessary for him to communicate from time to time.

The discussion of Independent capitalizations, etc., is an indefinite slur which the Bell company cannot substantiate by statements of fact in detail. When the company attempted to give details regarding Independent capitalization and Independent failures in a previous circular, TELEPHONY obtained and published the facts for a sufficient number of cases to show that the circular was broadly untrue. Without recurring to the subject of the former companies whose names were mentioned, and correcting the unjustifiable statements which it had spread before the banks of the country, we find the "System" now coming forward with the remarkable statement that "The percentage of failures in these groups has been from 15 to 20 per cent in the last few years." This statement is made after it was proven by statements of bank presidents, responsible merchants and others that of the 114 companies which it was able to scrape together after the most diligent search and present as failures in its previous circular, only a small number, mostly rural lines of trifling value, were actually failures. The significance of this previous circular is brought out in a statement issued and extensively distributed by the International Independent Telephone Association at the time of the publication of the previous A. T. & T. circular.

The present statement is indeed fearfully and wonderfully made. It has been circulated among banks, where it will speak for itself and the company which issues it. Independent operating officials have an excellent opportunity to present facts about their business, and that of their competitor, to follow up this opening which has been made.

It is worthy of note that at the time the previous circular was issued TELEPHONY brought out the fact that it was aimed no less to injure the credit of sub-licensee companies, connecting with the Bell lines, but not controlled by it, than of strictly Independent companies. In the present circular a clumsy attempt has been made to cover this situation sufficiently to fool the sub-licensees themselves, while to the bankers and others who may actually believe the story of Independent failures, the sub-licensee will seem to be no exception. The Bell company would hardly assert that the mere fact of allowing its lines to be connected to the switchboard of a company would change the financial condition of that company from bad to good. Yet, unless it does make this claim, it stands clearly open to the accusation of distributing a circular which is designed to injure the interests of companies which, by connecting with its lines, have become associated with it in attempting to develop a so-called universal telephone system, and are its business allies. Of course, if it could depress their

THE AMERICAN TELEPHONE & TELEGRAPH COMPANY
(BELL)

gives a **remarkable endorsement** to the **success and prosperity** of the

INDEPENDENT TELEPHONE COMPANIES

by publishing the names of such as have failed, re-organized, **or passed any dividends** during the **last five and one-half years.**

THE LIST SHOWED 114 SUCH COMPANIES.

A book published, June 1908, contains the names and capitalization of **12,045 NON-BELL OR INDEPENDENT TELEPHONE COMPANIES.**

What other representative business can show but 1% of failures, or **temporary suspension of dividends** during a period of five years?

INTERNATIONAL INDEPENDENT TELEPHONE ASS'N.

September 24, 1908 **Chicago, Illinois**

Significance of a Previous Bell Circular About Failures of Independent Telephone Companies.

securities in this way, it could buy in the plants more cheaply. But the circular is clumsy and untruthful, and will not fool even Bell stockholders, much less bankers and investors.

A Gas Plant Manager's Ideas on Depreciation.

In some features, the requirements of one class of public utility corporations are not so very much different from those of others. For this reason, telephone men may find something of interest in parts of a discussion of depreciation, and methods of providing for it in financial plans, contained in an address by President H. L. Rice, at the fifth annual convention of the Illinois Gas Association. He said:

"The general subject of depreciation remains as vexed and unsolved a question as ever. The three new state commissions have all decided to provide for one general charge against operating to care for depreciation from wear and tear, obsolescence and inadequacy combined, the amount of this charge to be left for the present to the best judgment of the individual companies. This lumping of all depreciation into one item may be the best decision for the present, but in view of the relationship just explained between maintenance cost and that depreciation which is due to wear and tear, it would seem wise that ultimately some attempt should be made to separate this portion of the depreciation charge, which has no relation whatever, to the other depreciation factors, and apportion it among the maintenance accounts, in order that the experience of future years may check and determine the figures; for otherwise it is difficult to see how we shall gain adequate knowledge as time goes by, as to these items.

"I think we shall all agree as to the need for the most careful study and application of proper depreciation charges in connection with all depreciable property. We must realize that overestimates are to be avoided as carefully as underestimates and that in keeping our accounting safe we must be careful not to repeat the error today traceable in the condition of certain Massachusetts companies, of over-reduction of plant value. For this is not depreciation, but amortization of capital, and while perhaps entirely proper under certain conditions, can only be so if undertaken and agreed to, for what it is, and not to be undertaken under any other guise. Finally we must accept as inviolable the rule that all moneys set aside from earnings to care for depreciation in any of its forms, whether this setting aside be voluntary or by legislative or judicial mandate, shall never receive a final disposition for any other purpose un-

less with the same publicity as may have attended the expression of our first intentions.

"The financing of depreciation cost, and that cost itself, are two different matters, and difference of opinion exists regarding the proper methods of financing; or to put the question in another way, as to whether moneys set aside for depreciation shall or shall not be credited with interest; and as this is a question which somewhat affects rates, it deserves our careful study. Depreciation is, as has already been pointed out, of two kinds, that which current maintenance is constantly going on through wear and tear to the certain destruction of total value in due course of time; and that which springing from possible future obsolescence or inadequacy represents a hazard for which a fund must be established, measured as carefully as judgment will permit, if our business is to be operated within the limits of safety. The one is steadily going forward every day, the other is a possible and indeed a probable contingency of the future. It may therefore be argued, and I submit it for your consideration, that the financing of these two kinds of depreciation should be differently handled. In the case of wear and tear it would seem that the depreciation allowed cannot properly appear as a reserve fund, but that this is an actual decrease of plant value already existing, on account of which the proper plant account must be finally written down on our books; and although we may not for convenience at once close the reserve account established, in no way can we consider that we have established a fund such as could conceivably draw interest to its own betterment. But in the case of money reserved for a hazard of the future of uncertain date with no meantime reduction of plant value or loss of efficiency because of the hazard, it would seem that we have such a fund possibly entitled to the returns of its own earnings. The question is not whether such a fund, according to the use made of it, shall earn interest or not; for it seems almost beyond dispute that moneys, which, if invested in the undertakings of others, would earn interest, are equally entitled to earn it if for a time invested in our own, doing the work of that which would otherwise have to be borrowed at interest. But the question is whether this interest shall be credited as an earning to the general undertaking or to the special fund. In the one case the fund to be established must be financed by the percentage, in the other by the sinking fund method, and it can, I think, be demonstrated that unless we are to ask the consumers of today to assume some of the proper burden of those who will succeed them tomorrow, it is by the sinking fund method that we will proceed.

"What is urged, however, is that the separation of these two different kinds of depreciation, advantageous in the operating, is also proper in the financial department of our business, that only where we establish a fund for future hazard or contingency have we a choice as to methods of financing, and that that choice shall be fixed on the plan which will most equitably distribute the burden to be carried."

Mr. Rice also touched upon the subject of public utility commissions, and in this connection he said, in part:

"It is natural that in an address of this character, delivered at this time, there should be some mention of the present tendency toward public utility commissions and of those commissions that have been recently established. The arguments for and against this method of regulating corporations have been gone over too often to need repetition here and it is clear that regulation of this character may be a source of either good or evil according to the scope of such regulation, and the wisdom with which it is administered. To gain the desired end of protecting the public against the possible encroachment of corporate wealth and against its own ignorance, passion and prejudice, and, at the same time, to preserve all the benefits of individual endeavor; to keep regulation from encroaching on the province of operation; all these considerations need not only the most careful study, but must be approached for their proper solution with the most disinterested and high-minded endeavor. And with three such commissions newly established and in operation, the present does not seem to be a time when other legislative communities should rush to hasty emulation, but rather a time for careful observation and study of the application and effect of this new legislation, avoiding thus the needless economic waste of duplicate experiment. Public commissions of this character cannot be successfully administered without great expenditure."

The Operator's Last Word.

The Milwaukee long distance operator could not be expected to repeat what took place at her switchboard—but the Madison politician who was the subject, repeated it, although he didn't see the point—at first.

The politician's number was rung for about the seventeenth time that day by a Milwaukee operator, who wanted to know if his partner was there.

"No," declared the irate subscriber with "asides" that can be represented only with dashes and exclamation points.

"Where is he?" the operator asked again.

"In h—ll," snapped he.

"Well, when you see him," the operator said, "tell him to ring up Milwaukee and call for No. ———."—*Milwaukee Journal.*

Practical Questions and Answers

Complete Diagram for Slide Wire Bridge.

Will you please give diagram in full for arranging a sliding bridge for testing resistances similar to cut on page 295, issue of Sept. 26, 1908, to use a receiver and buzzer as illustrated on page 360 of October 10, 1908.

Fig. 1 gives the required diagram corresponding to Fig. 2, page 360, Oct. 10, 1908. Fig. 2 corresponds to Fig. 3, and Fig. 3 to Fig. 4 of the same issue.

Refinancing Mutual Company.

We are an Independent mutual company. Our capital of $5,000, all paid up, in shares of $25 each, is divided among 180 subscribers. The company, organized about four years ago, now owns about 400 telephones.

We charged a uniform price of $12 per year for service. The demand for telephones has been so great that we have incurred a debt of nearly $5,000 for material and construction. This bears interest at the rate of 7 percent, and is held by local banks, the directors endorsing notes. We would like to get this matter on a more business-like basis. How would we best proceed?

It would have been a little easier to have answered this query if the writer had stated the amounts of dividends which have been earned and paid. In the absence of this information it will be necessary to analyze the conditions to a limited extent. The writer claims 400 telephones in operation, with a total investment of $10,000, or approximately $25 per telephone; and capital stock of $5,000, with 180 stockholders, an average of $27 worth of stock held by each individual. It is a mystery how a plant can be built for such a small amount per telephone, since a bridg-

ing telphone, installed, together with the simplest of central office equipment, will cost no less than $13 per telephone; thus leaving $12 only for outside construction for each telephone installed. Assuming that the greater portion of the plant is of bracket type on 16-foot poles, and built with a good grade of wire, upwards of five telephones per mile of line will have to be secured to meet the conditions, and this is very much in excess of the usual number which can be secured. It is possible, however, that, this being a Mutual company, some poles and the greater portion of the labor or building have been donated, andd o not, therefore, show in the construction costs.

If the lines have been strongly built and the exchange is carefully managed, the operation and maintenance should not exceed $6.50 per annum per telephone, including taxes. An amount of not less than 10 per cent of the total investment should be placed in a fund for renewals, and depreciation of the plant. Ordinarily this percentage would be too high, but in the writer's judgment, and because of lack of further data, it would seem not to be too high, but rather too low, since it amounts to but approximately $2.50 per telephone per year, due to the low first cost of the lines. These items of expense amount to $9.00 per telephone per year, leaving $3.00 per year per telephone to apply on dividends, or 12 per cent on the investment.

It may not be that such an amount is being paid, and it goes without saying that under the above analysis it should not be paid, since $2.50 per year per telephone is not enough to care for depreciation and extraordinary expenses.

If this dividend is being paid, however, or any greater

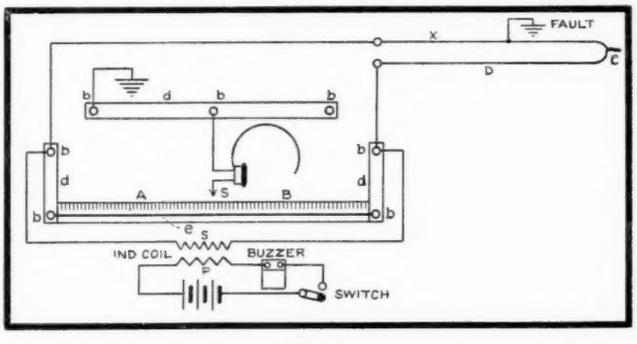


Fig. 1.

amount than the 7 per cent which is being paid at the banks, as interest on the notes, the best plan would be to replace the loan at the bank with bonds, which can usually be sold in rural territory, if made of low denomination, to yield 6 per cent, if the company and its officers have good reputations. The fact that the bank is loaning the $5,000 should be an endorsement for bonds of the same amount.

For the future, we assume that the field is not yet covered and that there is a demand for more telephones, and, of course, for more money to pay for them. It would seem that the only thing to do would be to increase the capital stock to an amount sufficient to build the entire territory,

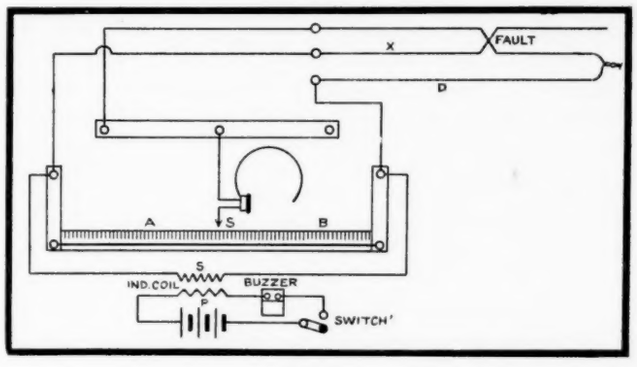


Fig. 2.

and get busy and sell stock to the present stockholders, and to present subscribers to service, who are not now holders of stock. This should be easy to do, as a good investment can be shown on a plant having such a low investment per telephone, at a rate of only $12 per year for service. If your shares are widely held and pay regular dividends, you will have nothing to fear from the competition of the company which gives service at less than

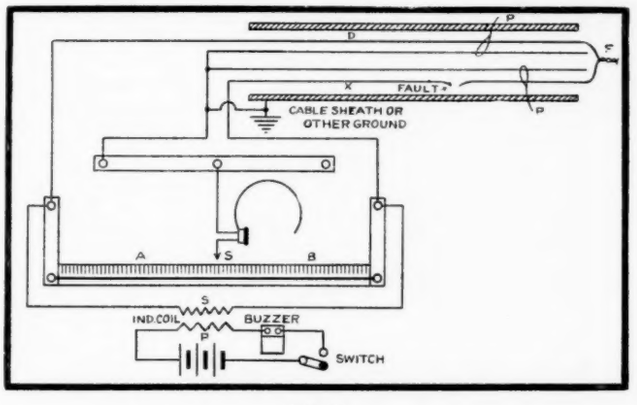


Fig. 3.

cost, which we understand operates in your territory. It cannot keep this up.

This plan would be better than to issue stock to replace $5,000 notes, as the present stockholders would get a higher return, and probably deserve it, if, as the plant cost seems to indicate, they have donated material and labor.

Telephone News

Extensions Planned by Many Ohio Companies.

The Independent telephone companies of Ohio are preparing to make extensive improvements in their plants. Since the summer season shows a continued improvement in business conditions, many of the managers are hurrying the improvements. Contracts have recently been made for new equipment to replace some old switchboards, to extend modern equipment, and also for extensive additions to the plants.

The Home Telephone Company of Dayton, of which John H. Ainsworth is general manager, will spend in the neighborhood of $150,000 for improvements and extensions. The work will be done both at the exchange and branches in Dayton proper, and also in a number of the surrounding towns which are controlled by the Home Telephone Company.

At Piqua, the Home Telephone Company will install a new switchboard having a larger capacity. This is to take care of many new telephones and to provide better service for the old subscribers. The contract for the equipment has been let.

At Bucyrus, the Bucyrus Telephone Company will erect

a large new switchboard, and make improvements in its outside plants. The company reports a large increasing business.

At Washington C. H., the Home Telephone Company will install new equipment throughout the entire plant. A number of extensions will also be made in the rural service.

Other companies such as the Citizens at New Lexington, and companies at other places in the Hocking Valley will also put in a lot of new equipment.

The Stark County Telephone Company, owned by the United States Telephone Company, is spending $60,000 in improvements, all of which comes from surplus earnings. The company is installing a number of automatic exchange units and will greatly increase the capacity of the plant. The Stark county company is in a very prosperous condition.

The Los Angeles Independent Telephone Directory.

The latest directory issued by the Home Telephone & Telegraph Company of Los Angeles has many interesting and valuable features which distinguish it from other books of the class.

The dimensions of the cover are six by eight inches. The book is closely printed upon a comparatively inexpensive paper, but numbers and names of subscribers appear in an open, bold faced type which makes them very clearly legible. Addresses follow names in ordinary letter type, according to the well established custom in making up directories. The book is an inch and a half thick and the directory proper covers 598 pages. The list of subscribers includes the Los Angeles exchange and a complete list of subscribers at points reached by the company's own and connecting long-distance lines, such as Alhambra, Covina, Long Beach, Pasadena, Pomona, Redlands, San Bernardino, San Diego, Santa Barbara, Whittier and many others.

The classified list includes names of Los Angeles business subscribers classified according to the nature of their business. Advertising is placed on covers, the first three pages inside the front cover and the page opposite the back cover, while inserts, limited in width, appear above and below the subscribers' list on pages throughout the directory.

50 CALL "F 94" WHEN PHONE IS OUT OF ORDER

CALL F 95 FOR LONG DISTANCE

CHINATOWN EXCHANGE

Part of Page from the Chinatown Section of the Los Angeles Directory.

Throughout the book are placed sentences calling attention to features of the company's business, among which are: "Why travel? Let us bring him to you. Use your Home telephone. It is a long-distance instrument"; "Why not have an extension telephone in your office or home?" "Your letter or telegram may be lost. Speech over the long-distance is positive. Our Long-Distance service is at your command."

An interesting feature of the book, such as is found in no other portion of the country except on the Pacific Coast is the list of the subscribers in Chinatown, the list being printed in English, with another list in Chinese characters, as shown in the illustration.

The front page of the directory bears the names of officers of the company, as follows:

A. B. Cass, president; W. C. Patterson; vice-president; F. M. Brown, E. J. Marshall, Thomas W. Phillips, Chas. C. Carpenter, W. H. Holliday, directors; and M. H. Hellman, treasurer; A. C. Schnetzler, asst. treasurer; E. P. Morphy, secretary, and L. Keller, engineer.

Book Review.

ELECTRICAL ENGINEER'S POCKET BOOK; by Horatio A. Foster; published by D. Van Nostrand Company, New York; 1,599 pages, with illustrations and tables; price $5.

Foster's handbook has long held the reputation of being a reliable electrical engineer's pocket book of almost universal scope, sufficing in itself as a primary reference work. In the present edition, the fifth, the author has not only made a thorough revision, to bring his text up to the latest developments in theory and practice, but has added a great amount of new matter. Fundamental theories, principles and laws are set forth clearly and amply, and their relation to practice through an immense amount of detail is brought out in a thorough-going style. The discussions of testing, including cable testing, winding of electromagnets, storage batteries, dynamos and motors, and electrolysis will be found worthy of frequent reference by the man in a telephone exchange. A discussion of transposition by Mr. F. F. Fowle is included; it sets forth fundamental knowledge which should enable a man to work out his own problems with more exactness than is commonly achieved; and the telephone section proper is worthy of commendation. The tables are an indispensable aid to rapid and exact calculation of all sorts of electrical and mechanical problems in every-day practice. The book is well bound, and thoroughly indexed.

It is no less essential to the telephone engineer and electrician that he should have a clear knowledge of other branches of the electrical art than that he should know circuits operated under his own supervision. Foster supplies so many of his needs that it is hard to conceive of a man considering himself well equipped for his work unless the book is in his possession.

Saskatchewan Government Issues Telephone Directory.

The Department of Railways and Telephones at Regina, Sask., Canada, has just issued a directory for the purpose of listing subscribers of the Government system. The list covers 60 pages, printed in widely spaced, heavy, easily legible type. The front page of the book contains the names of the persons responsible for the conduct of the telephone system in the Province, as follows: Hon. J. A. Calder, commissioner; S. P. Porter, deputy commissioner; J. Sutherland, superintendent, and W. Warren, engineer.

Sale of Racine Company Restrained.

At Racine, Wis., July 28, suit was begun by a stockholder to restrain other stockholders of Citizens Telephone Company selling to the Wisconsin Telephone Company; also claiming conspiracy between Wisconsin Telephone Company, Alonzo Burt, and officers of the local company. A restraining order was secured. The local company has about 1,000 more telephones than the Wisconsin company, and is in a prosperous condition. Its plant and service is unexcelled and the public is entirely satisfied.

Telephone Used in a Stupendous Theatrical Production.

The presentation of Schiller's play, "Joan of Arc" in the Harvard Stadium called for arrangements entirely beyond the scope of the ordinary theatre. It was necessary to control the movements of in the neighborhood of a thousand players, performing before an audience of 20,000 seated about the mammoth amphitheatre. In order to properly direct the movements of so large a staff, the stage manager and his associates grouped the switches for controlling the lights in a bower among other scenery in the middle of the amphitheatre. From this location signals were given by means of buzzers to some persons operating switches in different parts of the structure, and detailed instructions were given by means of telephones over lines radiating to the different persons managing different parts of the movement.

Penny-in-the-Slot Control of Motor Driving a Booth Fan.

A new device is being given a trial by the American Union Telephone Company in one of its public pay-station booths in the Union Station of the Pennsylvania Railroad Company, Harrisburg, Pa. The device is the invention of James Evans, of Camp Hill, near Harrisburg, who has applied for a patent.

It is an electric fan which will run for two minutes upon one cent being dropped in a slot machine which is attached to the fan.

It is believed that it will be very popular under certain conditions, especially in locations where the traffic is not so great as to warrant electric fans being operated at the expense of the company which maintains the booth.

Rumored Plans for Consolidation of Ohio Telephone Properties.

Centralization of the control of telephone companies, both Indepndent and Bell, is now the avowed policy of the managers of many telephone properties in competitive territory. Both interests see that a closer organization is necessary for effective work.

Negotiations are under way for many of the smaller Independent companies in Ohio to be taken over by the larger and stronger corporations.

The Columbus Citizen's Telephone Company, of Columbus, O., may absorb the London Home Telephone Company of London, O. The concern has a large number of subscribers in the city of London, and in Madison county, of which London is the county seat. The officers of the Columbus company have about closed the transaction. The company has a large plant, in good condition, and its acquisition will strengthen the Franklin County corporation which already controls all the Independent telephones in that county.

In the meanwhile, work on the plan for giving the management and control of the United States Telephone Company to the Independent corporations of the state is going forward. To that end a meeting was recently held in Cleveland, when the matter was discussed at length. A committee of seven has been appointed to devise a plan for taking over the control of the United States company, and having all the Independent corporations of the Buckeye state join in its management if they so desire. Another meeting will be held soon, when the matter will be farther discussed. Frank L. Beam, president of the Ohio Independent Telephone Association, is at the head of the committee working on the project.

As the long distance company is absolutely necessary for the welfare of the local Independents, they are taking quite an interest in the proposed change.

Indiana Telephone Clearing House Incorporates.

Articles of incorporation has been filed with the Secretary of State by the Indiana Independent Telephones Toll Clearing House. The capital stock is $10,000. The object of the corporation is to establish, maintain and operate telephone lines and telephone exchanges within the state of Indiana, and to conduct all other business relating to a system of toll clearances. The term of the corporation is 50 years. The incorporators are: Walter J. Uhl, Logansport; Theodore Thorward, South Bend; John W. Coffey, Indianapolis; Chas. S. Norton, Indianapolis; George W. Beers, Ft. Wayne; Jas. S. Brailey, Jr., Toledo, O.; W. W. Harbaugh, Sullivan; Nelson G. Hunter and Wm. W. Bailey, Richmond. The home office will be in the K. of P. Building, Indianapolis.

Telephone Patents

Conducted by Max W. Zabel

ELECTRICAL SELECTOR.

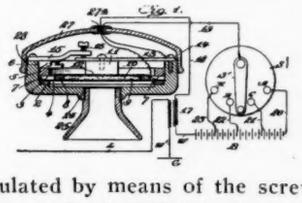
Ernest A. Faller, New York, N. Y., patent 927,455, July 6, 1909, assigned to North Electric Co., Cleveland, O.

This invention is designed to quickly and sufficiently test a plurality of trunk circuits by means of an automatic switch. Ordinarily, when an automatic switch, in making selections of an unbusy trunk passes over various contacts until it finds ground, the switch must remain in contact with each pair of terminals a sufficient length of time to give the relay an opportunity to make a circuit test. This present invention provides means whereby this expenditure of time is not necessary, as the testing operation is independent of the relay. A detailed explanation of the patent in this limited space cannot be undertaken.

TELEPHONE TRANSMITTER.

Chas. A. Randall, New York, N. Y., patent 927,395, July 6, 1909.

This transmitter is designed for high voltage work, and for this reason the diaphragm 4 has a large amount of granulated material, 9, covering almost its entire surface, and a plate, 12, is used, against which a strong spring, 13, presses, to hold the carbon electrodes in place. This pressure can be regulated by means of the screws 16. Various numbers of cells can be included in the battery, as shown.



TELEPHONE JACK.

Alfred L. Sohm, Whittier, Cal., patent 926,831, July 6, 1909, assigned to National Electric Works, Whittier, Cal.

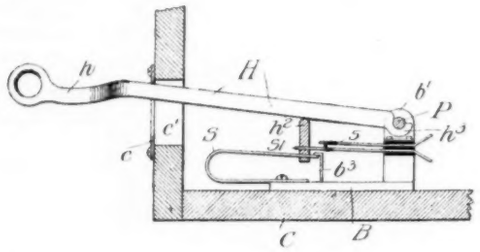
This invention contemplates a strip of spring jacks for a telephone switchboard, in which it is possible to remove each unit jack without disturbing the whole strip. To this end there is provided a base plate, having a front exten-

sion upon which is mounted the rubber strip for the thimbles, from the rear end of which transverse projections extend upwardly, the spaces between each pair of adjacent projections being occupied by one jack, consisting of a requisite number of springs and insulation strips between them. A cover strip lies over the jacks, and a locking rod, which can be withdrawn, holds the jacks in place.

ELECTRICAL SWITCH.

Ray H. Manson, Elyria, O., patent 926,951, July 6, 1909, assigned to Dean Electric Company, Elyria, O.

This switch-hook consists of the arm *H*, pivotally mounted about the shaft *P*. The springs are mounted as



shown, and a return spring *S*, having an insulating strip *h'*, bears against the lever *H* and also acts upon the spring s^1.

TELEPHONE SYSTEM.

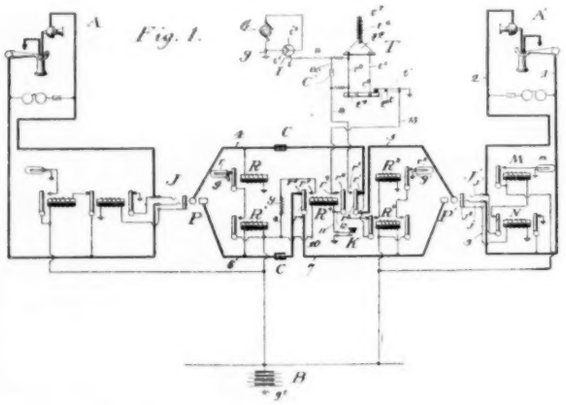
J. M. Latimer, Flushing, N. Y., patent 927,414 July 6, 1909, assigned to Consolidated Fire Alarm Co., New York.

This invention contemplates means for sending fire alarms or other signals over telephone subscribers' circuits. It comprises neutral relays, placed in the leads of the telephone circuits at the exchange, to repeat the signals from the telephone circuits to the circuits extending to the alarm-receiving headquarters. The telephone lines are also utilized for transmitting answering signals to the local points from which the alarm signals are transmitted, and to establish direct telephone connection between the points from which the alarm signals are transmitted and the alarm receiving headquarters. The construction is such that these objects are attained without interfering with the ordinary telephone exchange service over the lines.

AUTOMATIC RINGING CIRCUIT AND APPARATUS.

Ray H. Manson, Elyria, O., patent 926,950, July 6, 1909, assigned to Dean Electric Co., Elyria, O.

This invention consists of means whereby automatic periodic ringing devices at the central exchange are dis-



connected from the cord circuit when the called subscriber removes his receiver from the hook. To this end, a hot wire relay consisting of the two wires t^2 and t^3 are used to control springs *t* and t^1. When the current is such as to heat one of the wires more than the other, the relay operates and opens the circuit, the ringing key *K* connects the generator *G*, and the interrupter *I* in circuit by locking the relay R^4, which relay is released through the agency of the hot wire relay *T* when the receiver is removed.

DICTOGRAPH.

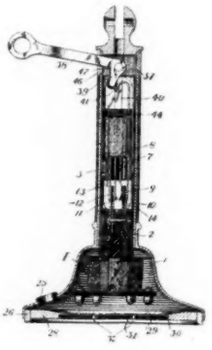
William F. H. Germer, New York, N. Y., patent 927,230, July 6, 1909, assigned to General Acoustic Co., New York.

This invention relates to dictograph apparatus, in which communication is established between a manager's office and a steongrapher, or between two managers or two different stenographers. In such systems this invention contemplates the use of two separate talking circuits, one for sending and the other for receiving; so that the conversation is not blurred; and the invention further consists in improved means for cutting out one of the manager's batteries when two managers are connected for conversation.

INDUCTION COIL.

Albert K. Keller, LaFayette, Ind., patent 927,413, July 6, 1909, asssigned to Sterling Electric Co., LaFayette, Ind.

This desk telephone consists of the ordinary base, 1, and its standard, 2, having the springs, 7 and 8, mounted as shown. The springs are provided with terminal facilities at the lower ends, to receive a circularly wound induction coil, *I*, which can be readily inserted merely by the use of



hand pressure. The lower face of this induction coil is provided with terminals, as shown, for connecting to the outside circuit.

ELECTRIC ISOLATION SYSTEM.

Nathaniel C. McClure, Healdsburg, Cal., patent 927,375, July 6, 1909.

A step-by-step signaling and lock-out system is here claimed, which has a sort of meter arrangement with a pointer at each telephone, and current supplying devices at the central station, so that the requisite amount of current can be sent out to actuate the meters a certain distance, the central station meter indicating where all of the substation meters are holding the pointers, thereby to make contact and call any desired substation.

CALL DISTRIBUTING EXCHANGE SYSTEM.

Sidney H. Browne, Pittsburg, Pa., patent 927,025, July 6, 1909, assigned to Am. Tel. & Tel. Co., New York.

This invention contemplates means relating to selecting devices at the central exchange for selecting an unbusy cord circuit, in which a testing relay is connected with the wiper of an automatic switch, this relay having an armature contact adapted to stop the movement of the testing wiper, and a local circuit controlled by an armature contact of the testing relay, by which circuit the energization of the testing relay may be continued independently of the testing wiper.

In the Manufacturing Field

Book Showing Types of Conduit Construction.

"Distribution of Electrical Energy" is the title of a very attractive book published by Mr. G. M. Gest, engineer and contractor for conduit construction, of New York City. The book describes briefly the advantages of conduit construction and contains over forty pages of photographic views illustrating various methods of placing wires underground. These views show work in progress in the United States and Mexico. and many of them are striking examples of good photography. The book is published in five languages, viz., English, Spanish, French, Portuguese and Italian.

THE TECHNICAL INDEX, a comprehensive record of current technical literature published in Belgium, announces that hereafter it will be represented in the United States by the Geo. H. Gibson Company, Tribune building, New York City. The Technical Index appears monthly, and gives a systematic descriptive record of all original articles appearing in over 200 engineering and technical journals and reviews, also indexing the proceedings of technical societies and technical books issued in all countries. The method of indexing covers the name of the author, the title of the article in full, an explanatory note stating the contents of the article, the name and date of the publication in which the article appeared and the length of the article. Two editions are printed, one upon both sides of the paper and one upon one side only for card index purposes, and for further convenience all items are arranged according to the Dewey decimal system. Clippings or copies of articles, also books, are supplied by the publishers of the Index, the price being indicated in each case. It is stated that over 1,000 original articles are indexed each month, covering all lines of engineering and technology. The American agents offer to send free sample copies upon request.

J. C. MURRAY, Indiana representative of the Kellogg Switchboard & Supply Co., has been appointed district sales engineer for Illinois, Indiana, Ohio, W. Virginia, Kentucky and the southern territory.

He will be succeeded in Indiana by Mr. F. C. King, of Logansport, Indiana.

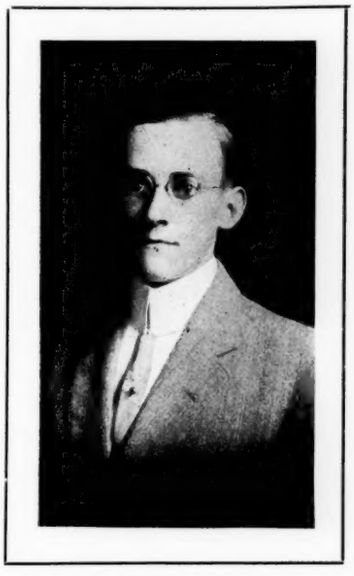
WILLIAM M. SMITH, for a number of years secretary and treasurer of the Chicago Insulated Wire Company, has resigned that position and is now sales manager of the American Insulated Wire & Cable Company, of Chicago, manufacturer of weatherproof electric wires, of which Mr. Nathan T. Brenner is president. Mr. Smith has had a wide experience in the electrical field, previous to which he was engaged in the banking business.

THE DEAN ELECTRIC COMPANY, of Elyria, Ohio, has just issued a booklet giving information about the construction and operation of its flash-light police and fire alarm system, which is winning general approval where it is being used in these municipal services. This system is the development of one installed by R. M. Eaton, president of the Niagara Country Home Telephone Company, of Niagara Falls, New York. The booklet presents concisely a general view of the system, the method of operation, and a description of the apparatus, with a few words about the cost of the equipment and the modern plant of the Dean company, where it is manufactured. The booklet will interest managers of telephone systems, who will find it worth while to investigate this system as a source of profit in the way of a by-product of their exchange service, as well as municipal electricians and committees of city governments.

The booklet is well arranged and amply illustrated, some of the illustrations being in colors, and is a very creditable description of an interesting device.

Murray E. Main.

Mr. Murray E. Main of Delaware, Ohio, who for several years past has sold telephone instruments of his own design in the Independent telephone field, has been appointed sales manager of the Rogers Telephone & Electric Company of Danbury, Conn. Although Mr. Main will still continue



Mr. Murray E. Main.

along his own line of business, which is the placing of magneto equipment on the market, it will not conflict with the lines of the Rogers company.

The Rogers Telephone & Electric Company manufactures interior instruments, such as intercommunicating systems, Biaphones, a New Standard two party line instrument, and also manufactures a very successful automatic non-interfering intercommunicating instrument. The factory of this company is very complete throughout, and only skilled labor is employed, thus making it possible to manufacture goods of high quality. Owing to the excellent facilities the Rogers company is able to make very reasonable prices on all the goods turned out by them.

Mr. Main has just made an extended trip through the Central and Western states to acquire additional information about telephone conditions in these sections.

THE INTERNATIONAL ELECTRIC COMPANY, formerly of 55 Redcross Street Barbican, London, England, announces that after the 1st of July its only address will be "Telephone Works, 111-115 Salusbury Road, Kilburn, N. W.," where new offices have been built adjoining its factory. The telegraphic address remains, as heretofore, "Genest, London." Special motor service is being arranged for its customers and the officers assure the same immediate attention and delivery as has been the policy of the company.

THE AMERICAN ELECTRIC FUSE COMPANY, of Muskegon, Mich., has just issued a catalog in which is listed its comprehensive line of equipment for protective telephone circuits. This covers various types of devices in common use including mica fuses, mounted and unmounted, plain carbon plate lightning arresters, combination mica fuse and carbon arresters, the American tubular fuses in which the fuse is covered with poreclain or wood, test connectors, cable terminals, wire connectors, cable compound and soldering paste, switchboard protectors, etc. Various devices are clearly illustrated and described and the book is made up in very convenient form, so arranged that additional leaves may be added as issued. One of the most interesting features of the catalog is the personal word on the title page in which it states, "The business of the American Electric Fuse Company started on a kitchen table, with a cash capital of $10. It has grown steadily every year since it was established in 1892, and now employs 400 workmen in its own factory, occupying 75,000 square feet of floor space and represents a total investment of over $500,000."

THE HOYT ELECTRICAL INSTRUMENT WORKS of Penacook, New Hampshire, with branch houses at 161 Summer St., Boston, Mass., 136 Liberty St., New York City, and an agency with the Beckley-Ralston Co., of Chicago, has issued an interesting pamphlet describing the new "Triune" voltammeter for direct current measurements. This instrument is provided with one voltmeter scale divided from 0 to 10, readable to 1/5 volt; an ammeter scale graduated from 0 to 30, readable to ½ ampere; and an ammeter scale graduated from 0 to 1½, readable to 1/20 ampere.

The instrument is of pocket size, arranged to fit into a case 4x3¼ by 2 inches. It was designed particularly for testing dry and storage batteries, automobile coils, and other coils of low resistance. The booklet fully describes the use of the instrument from a practical standpoint.

THE GENERAL INSULATE & MACHINE COMPANY, of Brooklyn, N. Y., reports a steady and good-sized demand for its well known line of hard-rubber substitutes, including telephone receiver cases, transmitter mouthpieces and other specialties. The reputation of this company has been so firmly established, not only on account of the quality of its goods but for its business methods, that its trade is of a particularly reliable character.

The officers of the company are: Joseph Steinberger, president, and Levi Swanson, secretary and treasurer.

THE AMERICAN ELECTRIC TELEPHONE COMPANY announces the sale of its No. 45 Burns' Express Switchboard, 150 drop size, to telephone companies at Shelbyville, Indiana; Carbondale, Kan.; Carreysville, Ind.; St. Paris, Ohio, Buelah, Mich.; Wimore, Ky.; Aburnette, Ia.; Brownstown, Ind., and Osgood, Mo.

Among the new features which have been added to this switchboard is the so-called "sure ring-off" cord circuit.

THE F. BISSELL COMPANY, Toledo, Ohio, has recently published a 50-page booklet describing a large number of the well-known "Security" line of construction and distribution specialties.

A diagram of the security telephone cable charts, which are printed on tough paper and given away by the company, appears in reduced scale at the back of the book.

THE SWEDISH AMERICAN TELEPHONE COMPANY, of Chicago, reports an unusually heavy demand for the new Radio telephone holder, which it placed on the market a few months ago. The telephone companies are interested in the device as it cuts down the cost of maintaining desk telephones.

An Interesting Advance Card.

M. J. Corwin
5 ft. 1 in.
Dean Representative in Seattle

W. S. Williams
6 ft. 4 in.
Dean Representative in Minnesota

¶We have the tallest telephone salesman on the road. The most diminutive is also a Dean Electric man.

¶And the little fellow makes the big boy hustle to sell more Dean apparatus.

¶Just like Dean equipment.

¶The sensitive little Dean Indestructible Transmitters keep the powerful, big Dean Multiple Switchboards busy—handling the new subscribers' calls.

¶The quality of Dean Harmonic service is better than a staff of solicitors.

¶Try it and see!

The Dean Electric Co.
Elyria, Ohio, U. S. A.
San Francisco Kansas City

THE ELECTRICAL ALLOY COMPANY, Morristown, N. J., has published a leaflet referring to its special electrical resistance wires sold under the specific guarantee that they have been submitted to the most exhaustive tests of the Electrical Testing Laboratories of New York city. The best known products and those which are in the greatest demand are the "ideal" wire, for use in making electrical instruments, shunts, resistance standards, etc.

SNEATHEN & AHLSTRAND, of Salt Lake City, have sent out announcements of their removal to more commodious quarters in the Commercial Block. This change was made owing to the increased activity in the telephone industry in that section of the country, which necessitated a larger office force and quarters to take care of the firm's growing business in engineering and contracting.

MR. JOSEPH H. WILLIAMSON, for 18 years business manager of the Manufacturers' Advertising Agency of New York, and for nearly 9 years in charge of the Philadelphia, and later New York office of the Viennot Advertising Agency, has opened an office at 719 Temple Court, New York, as a representative of trade journals.

THE F. BISSELL COMPANY, Toledo, Ohio, has issued a 28-page booklet giving useful information about telephone booths.

Condensed News Reports

Officers of companies are earnestly requested to forward us promptly all financial and other statements as soon as issued and any items of interest as to their plants and systems

NEW COMPANIES.

LAKE CITY, ARK. (Craighead County).—The People's Telephone Company has been incorporated at this place, and will almost immediately begin the construction of a telephone system. The incorporators are: P. J. Springer, C. S. Moore, W. S. Martin, G. W. Clements, J. P. Hooper, Fred Roberts and H. C. Beck.

DOWNS, ILL.—The Old Town Telephone Company is the name of a new company incorporated at this place for the construction of a telephone system. R. H. Roadman, John McBarnes and Z. T. Strayer are the incorporators.

PLEASANT PLAIN, IA.—Articles of incorporation have been filed by the Pleasant Plain Telephone Company, of East Pleasant Plain, Jefferson County, Iowa. It has an authorized capital stock of $15,000, and the incorporators are O. C. Spaulding, J. J. Kyle and Mahlon Roberts.

MAYFIELD, KY.—The West Mayfield Telephone Company was incorporated with a capital stock of $4,000. Many rural lines will be built in the near future. Dr. W. M. Rozzell, Noblin Rozzell and several others are interested.

LOUISVILLE, MISS. (Winston Co.)—The Winston Telephone Company is the name of a new telephone company incorporated here. The incorporators are G. W. Jarvis, J. D. Fulton and others, with a capital of $10,000.

WILLISTON, N. D.—W. W. Keitner, W. W. Wilde, Abraham Miller, all of Minot, have incorporated the Williams County Farmers' Mutual Telephone Company, with a capital of $10,000.

MERRICOURT, N. D.—The Dickey County Telephone Company was recently organized, and will erect and maintain a telephone system in this county. J. W. Crabtree, C. W. Sullivan and M. M. Cook are the directors.

OSWEGO, N. Y.—Articles of incorporation have been filed by the Oswego Telephone Company to build and operate lines from Oswego Center to North Hannibal and to Granby. Likewise a branch to Cornish Hill. The directors of this new company are James Calkins, A. M. Todd, M. D. Shelhammer, Frank Cooper, William Fenski and H. H. Phillips, all of Oswego Center.

ARCADIA, OHIO. — The Arcadia Mutual Telephone Company was incorporated at this place, with $10,000 capital. A. L. Anderson, Sherman Huffman, W. H. Dillery, E. E. Bish and G. W. Dick are the incorporators.

BOLTS FORK, KY. (Boyd County).—A new company recently incorporated at this place is known as The John Hazlett Telephone Company. V. B. Shortridge, D. L. Rucker, Lon Ross, W. H. Hogan and J. W. Woods are the incorporators.

INOLA, OKLA.—The Inola Telephone Company has been incorporated with a capital stock of $2,000. The incorporators are M. J. Cameron, J. E. Hathaway, John H. Ross and A. K. Critchen, all of Inola, and W. A. Crockett of Choteau.

SAN ANTONIO, TEXAS.—A new company incorporated here is the Blanco Road Telephone Company. Capital stock, $1,000. R. F. Pipes, A. Seidel, Ganahl Walker and Nat M. Washer are the incorporators.

LIMA, WIS. (Sheboygan County).—The Luna Telephone Company was incorporated, for the construction and operation of a telephone system. E. B. Melendy, Adam Leving and Henry Walsh filed articles of incorporation with the Secretary of State at Madison. Capital stock is placed at $5,000.

FRANCHISES.

EMPORIA, KAN.—The City Council passed the ordinance granting the Emporia Telephone Company a twenty-five year franchise to operate in this city.

MARION, KAN.—At a council meeting a new franchise was granted the Marion Mutual Telephone Company to operate for twenty years. The city has the right to demand the installation of cable in place of open wire, after five years. The new system will be commenced immediately, and must be installed within a year.

PICKLETON, WASH.—The Farmers' Mutual Telephone Company has been granted a franchise to construct a telephone line along the county highway near White Salmon.

FINANCIAL.

COMFREY, MINN.—The Comfrey Rural Telephone Company recently declared a 15 per cent dividend.

GLENDIVE, MONT.—The charter of the Eastern Montana Telephone Company was changed, increasing the capital stock from $15,000 to $60,000. The company at its annual meeting declared the payment of a 17¼ per cent dividend, showing the excellent financial condition of the company. New stock being issued is being taken up very rapidly.

ALBANY, N. Y. — Directors of the Albany Home Telephone Company recently declared the payment of a 1 per cent dividend.

DEFIANCE, OHIO.—The capital stock of the Northwestern Telephone Company has been increased from $60,000 to $100,000.

WEST SHORE, PA.—The West Shore Telephone Company has issued a $50,000 mortgage with the Union Trust Company, Harrisburg, as trustee. The money derived from the bonds to be issued will be used to extend the service of the company. Lines will be operated in Cumberland, Perry and York counties.

CONSTRUCTION.

GROVER, COLO.—The Grover Telephone Company has commenced the construction of a telephone line from Cheyenne, via Hereford, Carpenter and Camp Stool, and it is anticipated that by fall Grover will be in direct communication with Cheyenne, Wyo. D. M. Hawley is manager of this company, and is doing all in his power to give excellent service to subscribers. Henry Thompson was chosen to fill the vacancy left by the resignation of President E. E. Lewis on his removal to another city.

CRAWFORDSVILLE, IA.—Newspaper reports from Washington, Ia., state that the Mutual Telephone Company has purchased a lot and will soon begin the construction of a new exchange building.

SAC CITY, IA.—S. M. Elwood is having plans prepared for the reconstruction of his telephone plant.

DES MOINES, IA.—The Mutual Telephone Company will spend about $100,000 in extending and improving its system in this city. The work will begin at once. Several carloads of conduit and cable have already been received, and a section of new switchboard is expected. It is reported that this is simply a "starter" of what will follow.

ARTICHOKE, MINN.—The Artichoke Telephone Company is considering constructing a line to Morris, so as to secure connection between these two places.

GLENDIVE, MONT.—The line which was recently built by the Eastern Montana Telephone Company from this place to Miles City will now be extended to Sidney. The line from Miles City to Forsyth is being materially improved and extended.

HAMILTON, MONT.—The Montana Independent Telephone Company is making arrangements to open up an exchange in this city. The company has been granted a franchise, and construction will soon be under way. General offices and exchange of this company are in Butte.

LINCOLN, NEB.—The Lincoln Telephone & Telegraph Company contemplates installing new equipment in its South Lincoln exchange at an early date.

LOWVILLE, N. Y.—The Black River Telephone Company has been increasing very substantially of late. New lines are being built almost constantly. One has been put into service between Boonville and White Lake. During the rest of the year the company will install about 1,000 telephones, which will necessitate the building of many miles of wire in Lewis, Jefferson, Oswego and Oneida counties.

RENSSELAER, N. Y.—The Rensselaer Home Telephone Company has ordered two large submarine cables, which will be laid across the Hudson to connect with the Albany Home Telephone Company's exchange.

PERTH, N. D.—The Northern Telephone Company is installing a telephone plant in this town.

PARK RIVER, N. D.—The Farmers' Mutual Telephone Company, of which H. A. Smith is president, is building an extension to Golden and south of that place to other smaller places.

COLUMBUS, OHIO.—The board of directors of the Columbus Citizens' Telephone Company will within a short time let contracts for four new branch exchanges in this city. The new exchanges will involve an expenditure of about $150,000, and will be located at Arlington, North Columbus, South Columbus and in the East Side. It is reported that later an exchange may be built for the West Side.

DALLAS, TEX.—The Dallas Telephone Company has made all arrangements for and has secured a permit to erect a new exchange building, which will cost in the neighborhood of $40,000.

ALAMEDA, SASK., CAN.—At a meeting of the Alameda Rural Telephone Company it was decided to make preparations at once for the construction of a telephone system.

PORT ARTHUR, ONT., CAN.—The City Council has decided to purchase the holdings of the Bell Telephone Company.

PORT WILLIAM, ONT., CAN.—The Canadian Pacific Railroad is now stringing a telephone wire between this place and White River, and another line between Winnipeg and Brandon, Man., is practically completed. These are the first two sections of a telephone line which this company intends building along its system from the Atlantic to the Pacific Coast.

ELECTIONS.

CENTER, IDAHO.—J. W. Pottenger was elected president, and D. M. Cox, secretary, of the Long Valley Telephone Company.

NEWTON, ILL.—The Newton Telephone Company held its annual meeting recently for the purpose of electing officers, which election resulted as follows: William M. Pyle, Charles A. N. Faller, George Westerman, A. F. Calvin, Dr. A. A. Franke. A meeting was also held at night, and W. A. Miller, A. F. Calvin and A. A. Franke were named as executive committee.

PERU, IND.—At the annual meeting of the Home Telephone Company officers, the old directors were re-elected for another year, as follows: Louis B. Fulwiler, Joseph M. Bergman, Dr. W. A. Huff, Jerome Herff, Dr. J. E. Yarling, Joseph Andres and Dr. E. H. Griswold.

QUENEMO, KAN.—A meeting of the stockholders of the Quenemo Telephone Company was held in the Farmers' State Bank last Saturday morning and new directors elected. The directors chose as officers, E. M. Smart of Stafford as president; H. H. Wiggans, vice president, and C. E. Logan, general manager, secretary and treasurer.

COMFREY, MINN.—The annual meeting of the Comfrey Rural Telephone Company was held recently, and the election of officers resulted as follows: J. A. Prim, president; Oscar Thor, vice-president; C. L. Lindersmith, secretary; Oscar Erickson, treasurer. Directors, W. C. Schweiger, M. B. Harrison, A. W. Pederson, Andrew Steinman and Charles Elg.

LEBANON, MO.—At the annual meeting of the stockholders of the Ozark Telephone Company Tuesday, W. C. Faubion, J. W. Farris, Robert Blickensderfer, O. L. Weissgerber and A. E. Steinberg were elected directors for the coming year.

GLENDIVE, MONT.—The stockholders of the Eastern Montana Telephone Company met recently and nearly all of the stock of the company was represented, and the meeting was an enthusiastic one. In the election of officers for the coming year there were but few changes. General Haskell tendered his resignation as the president of the company, and the vacancy was filled by the election of the Hon. William Lindsay and E. S. Herrick was made vice-president. The board of directors remains practically unchanged. Frank C. Hughes was continued as the secretary and L. R. Barnett as treasurer.

DUNDEE, N. Y.—The officers of the Dundee Telephone & Telegraph Company have appointed the following directors to serve for the term of one year: Dr A. J. Price and M. M. Price of Rochester, M. D. Sproul and Ernest Sproul of Altay, and F. L. Price, S. A. Price and C. A. Gilbert of Dundee.

LOWVILLE, N. Y.—A meeting of the board of directors of the Black River Telephone Company was held at the offices of the company recently, and the following directors were present: Payson F. Thompson, Henderson; C. W. Pratt, S. C. Capron and W. F. Carlin, Boonville, and George S. Reed and J. J. Domser of this village. Dr. W. A. Kelly was elected a director and vice-president to fill the vacancy caused by the resignation of George R. Fuller of Rochester. This completes the reorganization of the Black River Company, the officers of the company now being: C. W. Pratt, president and treasurer; Dr. W. A. Kelly, vice-president; S. C. Capron, secretary, and J. J. Domser, manager.

PRESTON, N Y.—At the annual meeting of the Preston Norwich Telephone Company of July 3, the following directors were elected for one year: B. E Slater, L. S. Law, Floyd Crumb, H. D. Franklin, F. Quinn, C. W. Powers and Fred Lackers. L. S. Law was elected president; B. E. Slater, vice president; C. W. Powers, secretary; G. H. Nicholson, treasurer.

STARKWEATHER, N. D.—The stockholders of the Farmers' Telephone Company, of Starkweather, met at that place, and as a result of that meeting the following officers were elected: President, M. W. Revis; vice-president, Dave Jones; secretary P. C. Gering; treasurer, T. J. Dougherty; directors, M. W. Revi. P. C. Gering, Dave Jones, T. J. Dougherty and Fred Barteau.

CAMBRIDGE, OHIO.—The stockholders of the Cambridge Home Telephone Company held its annual meeting a short time ago, at which the following directors were elected for the coming year: J. M. McKitrick, H. P. Woodworth, D. M. Hawthorne, C. C. Cosgrove, M. L. Hartley, T. W. Scott and William Hoyle. The following officers were also elected: J. M. McKitrick, president, and William Hoyle, secretary, treasurer and manager, all for one year. These officers are the same as have been for the past year.

UNION CITY, TENN.—Stockholders of the Obion County Telephone Company met and elected officers as follows: President and general manager, W. G. Reynolds; vice president, Jake Caldwell; secretary and treasurer, W. R. Andrews. Directors: W. G. Reynolds, M. P. McMurry, Jake Caldwell, J. P. Adams, W. H. Gardner, S. P. Harris, Alex. Glover, S. L. Caruthers, E. T. Mitchell, W. W. Mays. This is a new company organized to get better county connections. Business will be opened as soon as the apparatus is installed. Company is capitalized at $5,000.

MISCELLANEOUS.

PARAGOULD, ARK. — The Home Telephone Company of Jonesboro is seeking a franchise in this place, for the purpose of installing a modern telephone plant. An ordinance granting the franchise has been read before the council, but has not as yet been passed.

BLOOMINGTON, ILL.—Mr. E. C. Martens has been appointed receiver of the McLean County Telephone Company, for the interests of the McLean County Bank.

PLYMOUTH, IND.—An effort is being made to revive the project for organizing in this county a Mutual telephone company. Application was made by Bernard W. Ross for a franchise for the Marshall and St. Joseph County Mutual Telephone Company. This movement is reported as having been instigated in the vicinity of Teegarden, near the St. Joseph county line, and is conducted mostly by farmers who want a neighborhood and local telephone system, which they have been unable to get from other companies. It will take about $50,000 to establish a telephone plant.

PONTIAC, ILL.—The telephone system of the Automatic Home Telephone Company was badly damaged a short time ago, when one of the sections of the switchboard was entirely demolished by fire. The damage is estimated at about $5,000. The fire was first noticed by the night long-distance operator, who noticed that there was trouble somewhere by a number of drops on her long-distance switchboard falling. The system will be put into working order just as soon as a new section can be procured and the damage to cables, etc., repaired.

SOUTH BEND, IND.—The South Bend Home Telephone Company has just completed the compiling of a new directory. The list of subscribers shows a most substantial increase over the number listed in the last book.

IMLAY CITY, MICH.—A new Independent company which was recently organized in Lapeer county has just installed a system in this place and the exchange has been opened. Myron Fancher of this place is manager of this exchange, and also secretary of the company. The company contemplates covering the entire county gradually, having about 75 miles of wire, exclusive of that used in the towns already up.

CROOKSTON, MINN.—The Angus - Tabor Telephone Company is expanding very rapidly, and many new subscribers are being added to its list.

DULUTH, MINN.—The work of taking down its poles, cables and wires on East First street, between First and Ninth Ave. east, has been begun by the Duluth Telephone Company. According to G. A. French, superintendent of the company, the job will be completed by the end of two weeks. If favorable weather conditions continue, the underground conduits in the east end will be finished by that time.

ROME, N. Y.—The property of the Rome Home Telephone Company was sold by the bondholders July 14. The property was bid in by James S. Brailey, of Toledo, Ohio, acting for the bondholders, for $20,100. The plant will be rebuilt and an automatic exchange installed.

NORMAN, OKLA.—The Norman Telephone Company is improving its system considerably by installing new wire, poles, etc.

SUSQUEHANNA, PA.—It is announced that C. A. Jayne and T. D. B. Ainey, president and secretary of the Montrose Telephone Company, have made arrangements whereby the Merchants' Telephone Company, the Tunkhannock and Wyoming Valley Telephone Company and the Montrose Telephone Company are merged into one. This merger covers a large territory, including Wilkesbarre, Scranton and Tunkhannock, south, and Binghamton, north, offering a large and profitable field. At a recent meeting of directors Dr. U. E. Dornslife of Tunkhannock, manager of the Mercantile Company, was elected manager of the company. The reorganized company will be known as the Merchants' Telephone Company.

CARTHAGE, TENN.—Representatives from about thirteen different Home organizations throughout Smith, Dekalb, Macon, Jackson and Putnam counties met recently at this place for the purpose of effecting an organization of the various Home telephone companies. A central organization was formed and will be known as the Home Telephone Association. The purpose of the Association is to unite all the different bodies into one strong concern for the betterment of the service and the continued extension of Home lines.

ORANGE, TEXAS.—The Orange Telephone Company, which was recently sold under a decree of the court, and which was purchased by bondholders of Kenton, Ohio, has been reorganized. E. L. Bruce and H. M. Shingle of Orange, among others of Kenton, Ohio, are the directors. Mr. Shingle is the manager of the company.

WYLIE, TEX.—The telephone exchange in this town was recently completely destroyed by fire.

PROSSER, WASH.—The Benton Independent Telephone Company, doing business at this place and neighboring towns, purchased the plant of the Prosser Telephone Company, and have combined the two systems, having about 800 subscribers, locally and in the ranches. The Benton company started business less than a year ago, with 30 Ranch telephones. In October the company built a first-class all-multiple cable plant. It now owns and operates lines to the Horseheaven and Rattlesnake districts, and to the towns of Byron, Paterson and Grandview, and has an exchange at this latter place.